DOCUMENT RESUME

ED 180 790 SE 029 431

TITLE	Competency Based Business Education: Business Math/Related Rules.
INSTITUTION	Wisconsin Univ., Madison. Wisconsin Vocational Studies Center.
PUB DATE	[78]
NOTE	163p.; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type
AVAILABLE FROM	Wisconsin Vocational Studies Center, 1025 W. Johnson St., Publications Unit, Room 265, University of Wisconsin, Madison, WI 53706 ($5.50)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Business Education; Business Skills; Calculation; Decimal Fractions; Fractions; Interest; Learning Activities; *Mathematical Applications; Objectives; Percentage; *Performance Based Education; Practical Mathematics; Problem Sets; *Secondary Education; Secondary School Mathematics; *Vocational Education
IDENTIFIERS	Business Mathematics

ABSTRACT

Modules on fractions, decimals, percentages, discounts, interest, the adding machine, and the calculation of a depreciation are included. Each module contains objectives, learning activities, pre-practice exercises, practice exercises, and post-practice exercises. At the beginning of each module, the importance of the module is explained. (MK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED180790

U S DEPARTMENT OF HEALTH.
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Merle E. Strong

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE 029 431

Module No. 22.200

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

GENERAL COMPETENCIES--OTHER

Instructional Unit:

BASIC MATH

Module Title:

FRACTIONS

Prerequisite Module(s):

ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF WHOLE NUMBERS (NOT INCLUDED)

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-4

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

The use of fractions is unavoidable in business transactions, including the purchase of stocks which are quoted in fractional parts of a dollar. Certain lines of business, such as yard goods, dairy products, lumber, and groceries use fractions extensively.

OBJECTIVES:

When you finish this module, you will be able to:

1. Add
2. Subtract
3. Multiply
4. Divide fractions

In order to do this, you will:

Need a pencil

You will know that you can do this when:

You can (1) add, (2) subtract, (3) multiply and (4) divide fractions with 90 percent accuracy.

If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

Wisconsin Business Education Curriculum	Major Instructional Area	Instructional Unit	Module No.	Page No.
	Gen. Comp. Other	Bas. Math	22.200	2

Objective 1-4

WORDS YOU WILL WANT TO BE FAMILIAR WITH BEFORE BEGINNING THIS OBJECTIVE:

Prime number - any number that cannot be divided by any number except itself and one.

Example: 1,/ 2,/ 3,/ 5,/ 7,/ 11,/ 13,/ 17,/ 19, etc.

When you feel you are familiar with the above terms, go on to the next page.

FRACTIONS

A fraction is a part of a whole. Example (Ex): If we have one yard and divide it into four equal parts and we only want three parts, the three parts may be expressed as 3/4 of a yard. This number 3/4, is a common fraction. It has a whole number above the line and a whole number below the line. The numerator is the number above the line and the denominator is the number below the line.

The fraction line also indicates division; that is, 3/4 means 3 divided by 4.

The common fractions are usually halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and sixteenths. The common fractions used in business are generally concerned with measures such as inches, yards, dozens, pounds, gallons, etc. Ex: ½ yard, ¼ inch, 1/3 pound.

A common fraction may be proper (the numerator is smaller than the denominator) or improper (the numerator is equal to or larger than the denominator). Ex: proper fractions 3/4, 2/9, 1/8; improper fractions 8/3, 15/8, 10/10.

A mixed number is a whole number followed by a proper fraction. Ex: mixed number 1¼, 12 1/8, 14 9/13. When the word "fraction: is used, generally it refers to a proper fraction.

Now do Problems 1 and 2 of the Practice Exercise on Page 16.

THEN GO ON TO PAGE 5.

ADDING FRACTIONS

(AFTER 1 and 2) ⟶ To add two or more fractions, the fractions must have a common denominator. Ex: 1/4 + 1/4 = 2/4. To add two or more fractions with different denominators, the fractions must be changed to have a common denominator. When this denominator is the smallest number possible, it is called the least common denominator.

$$\boxed{\text{Ex: } 1/12 + 5/18 + 3/20 + 1/40}$$

You can see that these fractions have different denominators. We already know that they must be the same. Here is the way to find the least common denominator.

Write the denominators across the sheet of paper like this:

$$\boxed{12 \quad 18 \quad 20 \quad 40}$$

Divide these by any prime number (can't be divided) other than one that will go into two or more of them, and write the quotients beneath. You can see that all of them can be divided by the prime number 2. Set it up like this:

$$\begin{array}{r|rrrr} 2 & 12 & 18 & 20 & 40 \\ \hline & 6 & 9 & 10 & 20 \end{array}$$

If any denominator cannot be divided by the prime number used, simply carry that number as it is.

$$\begin{array}{r|rrrr} 2 & 12 & 18 & 20 & 40 \\ \hline & 6 & 9 & 10 & 20 \\ \hline & 3 & 9 & 5 & 10 \end{array}$$

GO ON TO PAGE 6.

LEARNING ACTIVITIES:

Objective 1

Notice that the 9 cannot be divided by 2. Therefore, we simply carry the 9 as it is. Continue in this manner until two or more of the remaining numbers can no longer be divided by a prime number.

2	12	18	20	40
2	6	9	10	20
3	3	9	5	10
5	1	3	5	10
	1	3	1	2

When you can divide no further, multiply all numbers outside the lines.

2	12	18	20	40
2	6	9	10	20
3	3	9	5	10
5	1	3	5	10
	1	3	1	2

2 x 2 x 3 x 5 x 1 x 3 x 1 x 2 = 360.

360 is the least common denominator.

Now do Problems 3 and 4 of the Practice Exercise p. 16.

(After 3 and 4) → Now that we have a common denominator, we can add the fractions by changing the numerator to go along with the denominator. Here's how we do it.

Divide the least common denominator by the original denominator. Ex:

360 (l.c.d.)	÷ 12 (original denominator of 1/12)	= 30.

Then multiply that number (30) by the numerator (1). Ex: 30 x 1 = 30. This is your new numerator. So your new fraction is 30/360. Continue with the remaining fractions

ON TO THE NEXT PAGE...

in the same manner. Let's look at the second fraction in the addition problem. It was 5/18.

Step 1: $360 \div 18 = 20$

Step 2: $20 \times 5 = 100$

Step 3: $\frac{100}{360}$

Here is the way the addition problem should look.

$$\frac{1}{12} = \frac{30}{360}$$

$$\frac{5}{18} = \frac{100}{360}$$

$$\frac{3}{20} = \frac{54}{360}$$

$$\frac{1}{40} = \frac{9}{360}$$

Now we simply add the numerators of the fractions and leave the denominator as it is. Do you see now that we couldn't do this if we did not have the same denominator in every fraction?

$$\begin{array}{r} \frac{30}{360} \\ \frac{100}{360} \\ \frac{54}{360} \\ \frac{9}{360} \\ \hline \frac{193}{360} \end{array} = \text{sum or answer}$$

Now do Problems 5 and 6 of the Practice Exercise p. 16 GO ON→

LEARNING ACTIVITIES:

Objective 1

(After 5 and 6) → You may have noticed already that your answer to Problem 5 is an improper fraction. This must be changed to a mixed number first. Your answer was $\frac{265}{120}$.

To change this improper fraction to a number which has more meaning to us and one which shows us better what we really have, we must reduce the fraction to its lowest terms. This means that the fraction is in its simplest form.

To reduce $\frac{265}{120}$ to its lowest terms, a mixed number, divide the numerator by the denominator 265 ÷ 120 = 2 with a remainder of 25. Our new mixed number is now 2 $\frac{25}{125}$. We still have not reduced the remaining fraction ($\frac{25}{125}$) to its lowest terms. It is reduced to its lowest terms when the numerator and the denominator cannot be divided by a common number.

We can see that $\frac{25}{125}$ can still be divided by a common number: 5. 25 ÷ 5 = 5. 120 ÷ 5 = 24. Our new fraction is $\frac{5}{24}$. It cannot be divided by another common number. It is now reduced to its lowest terms.

Now you are ready to do Problems 7 and 8 of the Practice Exercise on page 16.

(After 7 and 8) → Let's suppose that you want to add a whole number and some fractions. Ex: 2 + ¼ + ½. Remember we must have a common denominator. You can see that all of these numbers

GO ON TO PAGE 9 ......

can be expressed in fourths. ¼ = ¼. ½ = 2/4. To change the whole number to fourths, we first change the whole number 2 to a fraction, 2/1. (Any whole number can be changed to a fraction by making the number the numerator and by making the denominator 1.) Now we can change our new fraction, 2/1, to fourths, 8/4. All that's left to do now is add the fractions: 8/4 + 1/4 + 2/4 = 11/4.

Believe it or not, you're almost done with this mod. Just hang in there through Problems 9 and 10 of the Practice Exercise p. 16.

(After 9 and 10) → YOU DID IT! Now ask your instructor for the Post-Practice Exercise for adding fractions. Good luck!

SUBTRACTING FRACTIONS

To subtract one fraction from another fraction, we simply subtract one numerator from the other. The denominator remains the same. Ex: $\frac{5}{12} - \frac{1}{12} = \frac{4}{12}$. Now, as in addition, we must reduce to lowest terms. Therefore, $\frac{4}{12} = \frac{1}{3}$. You are now ready to tackle Problem 11 of the Practice Exercises p. 16.

Let's suppose that we have a problem like this: $\frac{2}{3} - \frac{1}{4}$. We cannot subtract these fractions as they are. We must have a common denominator. The common denominator of these fractions is 12. Therefore, $\frac{2}{3} = \frac{8}{12}$; $\frac{1}{4} = \frac{3}{12}$. Now we can work with this problem. $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$. The answer, $\frac{5}{12}$, is already reduced to its lowest terms.

Work Problem 11 of the Practice Exercise p. 16.

(After 11) → Now take a look at this problem. $24\frac{3}{8} - 9\frac{1}{4}$. We still subtract the fractions in the same manner but we subtract the whole numbers as they are. It should look like this:

$$\boxed{\begin{array}{rcl} 24\frac{3}{8} & = & \frac{3}{8} \\ 9\frac{1}{4} & = & \frac{2}{8} \\ \hline 15 \; + & & \frac{1}{8} = 15\frac{1}{8}. \end{array}}$$

Now you're ready to do an easy problem. Try number 12, p. 17.

(After 12) → Take a look at this problem. $6\frac{1}{9} - 3\frac{1}{3}$. Following the procedure we follow for subtracting, we set it up like this:

TURN TO PAGE 11.

LEARNING ACTIVITIES:

Objective 2

$$\begin{array}{r} 6\,\frac{1}{9} = 6\,\frac{1}{9} \\ 3\,\frac{1}{3} = \underline{3\,\frac{3}{9}} \\ ? \end{array}$$

Do you see the problem that we run into? We cannot subtract $\frac{3}{9}$ from $\frac{1}{9}$. We must increase the numerator to a numerator larger than 3. Here's how we do it. Do you remember when you were told that a fraction represents a part of a whole? Well, if we have something divided into 9 parts and we take all 9 parts, our fraction (now improper) becomes $\frac{9}{9}$. This fraction, $\frac{9}{9}$, equals 1. We simply add $\frac{9}{9}$ to $\frac{1}{9}$. At the same time, we subtract one number from the whole number six. We have moved 1 whole number from one part of our mixed number (the whole number 6) to another part (the fraction $\frac{1}{9}$). Here is how it looks:

$$\begin{tikzcd} 6 \arrow[d] & \frac{1}{9} \arrow[dr] & & & \\ 5\,\frac{9}{9} & + & \frac{1}{9} & = & 5\,\frac{10}{9} \end{tikzcd}$$

Now we can subtract. $5\,\frac{10}{9} - 3\,\frac{3}{9} = 2\,\frac{7}{9}$.

(After 13 and 14) → Do Problem 13 and 14 of the Practice Exercise on page 17.

You are now an expert at subtracting fractions! Get the Post-Practice Exercise from your teacher and show off your knowledge.

NOW ON TO PAGE 12.

MULTIPLYING FRACTIONS

To multiply two fractions, we must do three things:

1. Multiply the numerators.
2. Multiply the denominators.
3. Reduce to lowest terms.

Ex: $\boxed{\frac{3}{5} \times \frac{4}{9} = \frac{12}{45} = \frac{4}{15}}$

To make it easier for us to multiply and to eliminate the need for reducing the product to lowest terms, we can follow a procedure called cancellation before we do anything else. Cancellation means dividing a numerator and a denominator by a common divisor.

Ex: $\boxed{\frac{\overset{1}{\cancel{3}}}{5} \times \frac{4}{\underset{3}{\cancel{9}}} = \frac{4}{15}}$

In the example, you can see that the numerator 3 and the denominator 9 can be divided by 3. Once this is done, we can multiply the numerator 1 times the numerator 4. In this way, we are able to work with smaller numbers. We can also multiply the denominator. The best part is that now there is no need to reduce to lowest terms. You try a couple now.

Sometimes it is possible to cancel both sets of numerators and denominators.

Ex: $\boxed{\frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{4}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{3}{\cancel{9}}} = \frac{1}{6}}$

You can see that the 3 and the 9 can be divided by 3. At the same time, the 2 and the 4 can be divided by 2.

CONTINUE ON NEXT PAGE.

LEARNING ACTIVITIES:

Objective 3

Do Problem 15 of the Practice Exercise on Page 17.

(After 15) ⟶ At times, we must multiply three or more fractions. We do it in a way much the same as when we multiply two fractions.

Ex: $\frac{3}{4} \times \frac{5}{12} \times \frac{6}{21} = ?$

Here is one way of cancelling in this problem.

1. $\frac{3}{4} \times \frac{5}{{}_{2}\cancel{12}} \times \frac{\overset{1}{\cancel{6}}}{21}$

2. $\frac{\overset{1}{\cancel{3}}}{4} \times \frac{5}{{}_{2}\cancel{12}} \times \frac{\overset{1}{\cancel{6}}}{{}_{7}\cancel{21}} = \frac{5}{56}$

Now let's look at another one.

Multiply $\frac{2}{3} \times \frac{4}{5} \times \frac{9}{16} \times \frac{5}{7}$.

1. $\frac{2}{3} \times \frac{\overset{1}{\cancel{4}}}{5} \times \frac{9}{\underset{4}{\cancel{16}}} \times \frac{5}{7} =$

2. $\frac{2}{{}_{1}\cancel{3}} \times \frac{\overset{1}{\cancel{4}}}{5} \times \frac{\overset{3}{\cancel{9}}}{\cancel{16}_{4}} \times \frac{5}{7} =$

3. $\frac{2}{{}_{1}\cancel{3}} \times \frac{{}^{1}\cancel{4}}{{}_{1}\cancel{5}} \times \frac{\cancel{9}^{3}}{{}_{4}\cancel{16}} \times \frac{\cancel{5}^{1}}{7} =$

4. $\frac{{}^{1}\cancel{2}}{{}_{1}\cancel{3}} \times \frac{{}^{1}\cancel{4}}{{}_{1}\cancel{5}} \times \frac{{}^{3}\cancel{9}}{{}_{\underset{2}{\cancel{4}}}\cancel{16}} \times \frac{{}^{1}\cancel{5}}{7} = \frac{3}{14}$

Now do Problem 16 of the Practice Exercise p. 17.

(After 16) ⟶ Sometimes we must multiply a whole number by a fraction.

Ex: $2 \times \frac{3}{4}$

GO ON TO PAGE 14.

LEARNING ACTIVITIES:

When this happens, we change the whole number to a fraction and multiply. Like this: $2 = \frac{1}{2}$. (Remember any whole number can be changed to a fraction by making the whole number the numerator and the number one the denominator.) Now we can multiply. $\boxed{\frac{^1\cancel{2}}{1} \times \frac{3}{_2\cancel{4}} = \frac{3}{2} = 1\frac{1}{2}}$

Try Problem 17 of the Practice Exercise p. 17 now.

(After 17) ⟶ At times mixed numbers have to be multiplied by a fraction and the first step is to change the mixed number to a fraction. Then multiply. Ex: $3\frac{1}{2} = \frac{4}{7}$. 3-1/2 can be expressed in halves. We know there are two halves in every whole, so we simply multiply two times three (the number of wholes). Our product (answer), six, is the number of halves in three wholes. So, $3 = \frac{6}{2}$. Now we can go one step further. Our mixed number is 3-1/2. We already know that $3 = \frac{6}{2}$. So, $\frac{6}{2} + \frac{1}{2} = \frac{7}{2}$. Or, $3\frac{1}{2}$ $\frac{7}{2}$. Now we have a fraction we can work with in the multiplication problem.

$$\boxed{3\frac{1}{2} \times \frac{4}{7} = \frac{^1\cancel{7}}{_1\cancel{2}} \times \frac{^2\cancel{4}}{_1\cancel{7}} = \frac{2}{1} = 2.}$$

Follow this procedure every time you multiply mixed numbers and fractions or just mixed numbers.

Ex: $\boxed{4\frac{2}{3} \times 2\frac{1}{4} = \frac{^7\cancel{14}}{_1\cancel{3}} \times \frac{^3\cancel{9}}{_2\cancel{4}} = \frac{21}{2} = 10\text{-}1/2}$

Now do Problem 18 of the Practice Exercise and you're home free.

(After 18) ⟶ Now get **Post-Practice Exercise for Objective 2 from your** instructor and DO YOUR THING!

LEARNING ACTIVITIES:

Objective 4

Now that you have mastered multiplication of fractions, division will be a snap for you. You simply invert your divisor (turn it upside down) and multiply.

Ex: $\frac{3}{4} \div \frac{1}{2} = \frac{3}{{}_{2}\cancel{4}} \times \frac{{}^{1}\cancel{2}}{1} = \frac{3}{2} = 1\frac{1}{2}$

dividend divisor

You will use this same procedure when you work with all types of problems involving fractions, mixed numbers, whole numbers and fractions, etc.

Ex: $\frac{4}{5} \div 8 = \frac{4}{5} \div \frac{8}{1} = \frac{{}^{1}\cancel{4}}{5} \times \frac{1}{{}_{2}\cancel{8}} = \frac{1}{10}$

Ex: $8 \div \frac{4}{5} = \frac{{}^{2}\cancel{8}}{1} \times \frac{5}{{}_{1}\cancel{4}} = \frac{10}{1} = 10$

Ex: $2\frac{1}{2} \div 3\frac{3}{4} = \frac{5}{2} \div \frac{15}{4} = \frac{{}^{1}\cancel{5}}{{}_{1}\cancel{2}} \times \frac{{}^{2}\cancel{4}}{{}_{3}\cancel{15}} = \frac{2}{3}$

Now do Problems 19-24 of the Practice Exercise p. 17.

(After 19-24)→ FANTASTIC! Now ask your teacher for the Post-Practice Exercise for Objective 4 and you're done.

GOOD WORK AND GOOD LUCK!

PLEASE DO ALL WORK ON A SEPARATE SHEET OF PAPER.

Objective 1-4

PRACTICE EXERCISE:

(CHECK YOUR ANSWERS ON PAGE 18)

1. If you have a whole unit divided equally into ten parts and only one part is taken, how is that part expressed in a fraction? ____________ fifteen parts? __________ two parts? __________

2. In each of the following fractions, decide whether it is proper, improper, or a mixed number. **(Then back to p5)**

   a. 1/3 ____________ d. 14/8 ______________

   b. 6/4 ____________ e. 2/9 ______________

   c. 2 1/2 __________ f. 1 1/2 _____________

3. Find the least common denominator of the following fractions.
   2/5 + 14/15 + 7/8 = ? L.C.D. = ______________

4. Find the least common denominator of the following fractions. **(Back to p6)**
   1/9 + 2/3 + 1/2 + 5/6 + 1/27 = ? L.C.D. = ___________

5. Add the following fractions. 2/5 + 14/15 + 7/8 = ____

6. Add the following fractions. **(Back to p8)**
   1/9 + 2/3 + 1/2 + 5/6 + 1/27 = ______________

7. Reduce the following fractions to lowest terms.
   19/6, 29/2, 51/48, 14/21, 375/1000, 75/80

8. Reduce the following fractions to lowest terms: **(Back to p8)**
   18/7, 79/32, 30/12, 48/64, 54/72, 18/54

9. Add the following: 2 1/8 + 1/4 + 3/8 = ______________

10. Add: 4 2/3 + 3/4 + 5/6 = ______________ **(Back to p10)**

11. Subtract: a) 4/5 - 3/5 = ______________

    b) 9/10 - 3/10 = ______________ **(Back to p10)**

MORE PROBLEMS ON THE FOLLOWING PAGE

12. Subtract: a) 2/3 - 1/2 = __________

b) 7/10 - 8/15 = __________

(Back to p10)

13. Subtract: a) 7 9/10 - 2 3/5 = __________

b) 4 5/6 - 1 1/3 = __________

14. Subtract: a) 56 1/4 - 49 7/8 = __________

b) 99 1/7 - 81 2/3 = __________

(Back to p11)

15. Multiply: a) 7/9 x 3/4 = __________

b) 4/5 x 15/16 = (Back to p13) __________

16. Multiply: a) 9/14 x 2/5 x 8/9 x 35/72 = __________

b) 2/3 x 7/10 x 3/4 x 1 7/8 = __________

(Back to p14)

17. Multiply: a) 3 x 2/3 = __________

b) 4 x 1/2 = (Back to p14) __________

18. Multiply: a) 6 3/4 x 2/9 = __________

b) 1 5/6 x 2 4/22 = __________

(Back to p14)

19. Divide: a) 1/3 ÷ 1/2 = __________

b) 3/8 ÷ 5/16 = __________

20. Divide: a) 7 ÷ 1/5 = __________

b) 14 ÷ 2/3 = __________

21. Divide: a) 2/ 5 ÷ 6 = __________

b) 5/8 ÷ 10 = __________

22. Divide: a) 6 2/3 ÷ 1/12 = __________

b) 8 4/9 ÷ 2/9 = __________

23. Divide: a) 7/8 ÷ 2 1/3 = __________

b) 3/4 ÷ 1 5/16 = __________

24. Divide: a) 7 1/5 ÷ 4 1/2 = __________

b) 4 4/5 ÷ 2 2/5 = __________

(Back to p15)

After completing the Practice Exercise, check your work with the Answer Key on page 18 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

PRACTICE EXERCISE KEY

1. 1/10

2. a. proper   d. improper
   b. improper   e. proper
   c. mixed number   f. mixed number

3. 120

4. 54

5. 2 5/24

6. 2 4/27

7. 3 1/6, 14 1/2, 1 1/16, 2/3, 3/8, 15/16

8. 2 4/7, 2 15/32, 2 1/2, 3/4, 3/4, 1/3

9. 2 3/4

10. 6 1/4

11. a. 1/5   b. 3/5

12. a. 1/6   b. 1/6

13. a. 5 3/10   b. 3/12

14. a. 6 3/8   b. 17 10/21

15. a. 7/12   b. 3/4

16. a. 1/9   b. 21/32

17. a. 2   b. 2

18. a. 1 1/2   b. 4

19. a. 2/3   b. 1 1/5

20. a. 35   b. 21

21. a. 1/15   b. 1/16

22. a. 80   b. 38

23. a. 3/8   b. 4/7

24. a. 1 3/5   b. 2

Objective 1

PRE-PRACTICE EXERCISE: ADDITION OF FRACTIONS

(to be completed if student desires or teacher suggests)

Add the following. Be sure to reduce to lowest terms. Write your answers on **your own answer sheet**.

1. 1/7 + 1/9 + 1/21 + 1/14 =
2. 1 14/16 + 7 2/3 + 8 11/48 + 9 3/4 =
3. 2/3 + 5/6 + 4/9 + 1/12 =
4. 3/32 + 5/64 + 1/20 =
5. 5/16 + 5/8+ 3/32 =
6. 2/5 + 14/15 + 7/8 =
7. 7 3/16 + 4 1/4 + 9 1/4 + 11 9/16 =
8. 8 7/10 + 2 4/5 + 9 5/8 + 8 9/40 + 9 7/15 =
9. 2/9 + 3/5 + 1/2 =
10. 4 3/10 + 12 1/8 + 3 2/5 + 3/4 =

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the activities for this objective or module by reviewing the Words You Should Be Familiar With as listed on page 3 .

Objective 2

PRE-PRACTICE EXERCISE: SUBTRACTION OF FRACTIONS

(to be completed if student desires or teacher suggests)

DIRECTIONS: Subtract and reduce to lowest terms. Do your work on **your own answer sheet**.

1. 2/3 - 1/3 =
2. 4/5 - 1/2 =
3. 3/4 - 1/3 =
4. 28 5/6 - 14 1/6 =
5. 65 3/8 - 37 5/16 =
6. 82 3/5 - 56 3/10 =
7. 56 1/4 - 49 7/8 =
8. 136 4/5 - 86 5/6 =
9. 73 1/4 - 42 5/7 =
10. 32 - 12 2/3 =

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the steps or activities for this objective or module by going on to the Learning Steps beginning on page 10.

PRE-PRACTICE EXERCISE: MULTIPLICATION OF FRACTIONS

Objective 3

(to be completed if student desires or teacher suggests)

DIRECTIONS: Multiply the following. Be sure your products are reduced to lowest terms. Do your work on **your own answer sheet**.

1. 2/3 x 3/4 =
2. 3/16 x 14/15 =
3. 2/5 x 5/9 x 3/7 =
4. 16 x 3/4 =
5. 15 x 9/20 =
6. 1/6 x 2 4/7 =
7. 6 3/4 x 4 =
8. 6 2/3 x 5 1/5 =
9. 7/10 x 1 1/8 x 6 2/3 =
10. 5/6 x 6/7 x 21 =

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the steps or activities for this objective or module by going on to the Learning Steps beginning on page 12.

PRE-PRACTICE EXERCISE: DIVISION OF FRACTIONS

Objective 4

(to be completed if student desires or teacher suggests)

DIRECTIONS: Divide and reduce to lowest terms. Do your work on **your own answer sheet**.

1. 1/8 ÷ 1/4 =
2. 14/15 ÷ 2/5 =
3. 15 ÷ 6/7 =
4. 3 ÷ 5/6 =
5. 5 ÷ 6 =
6. 2/5 ÷ 6 =
7. 5/8 ÷ 10 =
8. 9 1/3 ÷ 4 =
9. 7/8 ÷ 2 1/3 =
10. 7 1/5 ÷ 4 1/2 =

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the steps or activities for this objective or module by going on to the Learning Steps beginning on page 15.

POST-PRACTICE EXERCISE: ADDITION OF FRACTIONS

Objective 1

DIRECTIONS: Add the following. Be sure to reduce to lowest terms. Write your answers on your own answer sheet.

1. 3/4 + 3 2/5 + 12 1/8 + 4 3/10 =
2. 1/2 + 3/5 + 2/9 =
3. 9 7/15 + 8 9/40 + 9 5/8 + 2 4/5 + 8 7/10 =
4. 11 9/16 + 9 1/4 + 4 1/4 + 7 3/16 =
5. 7/8 + 14/15 + 2/5 =
6. 3/32 + 5/8 + 5/16 =
7. 1/20 + 5/64 + 3/32 =
8. 1/12 + 4/9 + 5/6 + 2/3 =
9. 9 3/4 + 8 11/48 + 7 2/3 + 1 14/16 =
10. 1/14 + 1/21 + 1/9 + 1/7 =

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective--2, page 10.

POST-PRACTICE EXERCISE: SUBTRACTION OF FRACTIONS

Objective 2

DIRECTIONS: Subtract and reduce to lowest terms. Do your work on **your own answer sheet**.

1. 15/16 - 12/16 =
2. 3/4 - 2/3 =
3. 5/8 - 5/12 =
4. 4 1/8 - 3/8 =
5. 5 1/6 - 5/6 =
6. 4 1/8 - 3/8 =
7. 58 1/6 - 23 2/3 =
8. 7 - 4/5 =
9. 21 5/8 - 11 9/10 =
10. 20 - 3/4 =

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed ~~to~~ the next objective --3, page 12.

POST-PRACTICE EXERCISE: MULTIPLICATION OF FRACTIONS

Objective 3

DIRECTIONS: Multiply the following. Be sure your products are reduced to lowest terms. Do your work on **your own answer sheet**.

1. 3/8 x 5/7 =
2. 2/3 x 1/2 =
3. 4/5 x 5/7 x 2/3 x 9/16 =
4. 2/5 x 8/9 x 9/14 x 35/72 =
5. 5 x 1/15 =
6. 8 x 3/4 =
7. 1 3/4 x 2 2/21 =
8. 2 2/3 x 7/10 x 3/4 x 1 7/8 =
9. 3 1/3 x 6 3/4 x 1/3 =
10. 6 x 2/3 x 2 =

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective--4, page 15.

POST-PRACTICE EXERCISE: DIVISION OF FRACTIONS

Objective 4

DIRECTIONS: Divide and reduce to lowest terms. Do your work on **your own answer sheet**.

1. 1/8 ÷ 1/4 =
2. 5 ÷ 2/9 =
3. 2 5/8 ÷ 7/24 =
4. 1 7/8 ÷ 3/5 =
5. 1/6 ÷ 1 4/5 =
6. 3/5 ÷ 3 1/3 =
7. 11/15 ÷ 1 3/8 =
8. 15 1/2 ÷ 7 3/4 =
9. 1 2/5 ÷ 2 1/2 =
10. 1 1/6 ÷ 2 2/3 =

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective or module.

PRE-PRACTICE EXERCISE KEY
Objective 1
Addition

1. 47/126

2. 27 25/48

3. 2 1/36

4. 71/320

5. 1 1/32

6. 2 5/24

7. 32 1/4

8. 38 49/60

9. 1 29/90

10. 20 23/40

PRE-PRACTICE EXERCISE KEY
Objective 2
Subtraction

1. 1/3
2. 3/10
3. 5/12
4. 14 2/3
5. 28 1/16
6. 26 3/10
7. 6 3/8
8. 49 29/30
9. 30 15/28
10. 19 1/3

PRE-PRACTICE EXERCISE KEY
Objective 3
Multiplication

1. 1/2
2. 7/40
3. 2/21
4. 12
5. 6 3/4
6. 3/7
7. 27
8. 34 2/3
9. 5 1/4
10. 15

PRE-PRACTICE EXERCISE KEY
Objective 4
Division

1. 1/2
2. 2 1/3
3. 17 1/2
4. 3 3/5
5. 5/6
6. 1/15
7. 1/16
8. 2 1/3
9. 3/8
10. 1 3/5

POST-PRACTICE EXERCISE KEY
Objective 1
Addition

1. 20 23/40
2. 1 29/90
3. 38 49/60
4. 32 1/4
5. 2 5/24
6. 1 1/32
7. 71/320
8. 2 1/36
9. 27 25/48
10. 47/126

POST-PRACTICE EXERCISE KEY
Objective 2
Subtraction

1. 3/16
2. 1/12
3. 5/24
4. 3 3/4
5. 4 1/3
6. 3 3/4
7. 34 1/2
8. 6 1/5
9. 9 29/40
10. 19 1/4

POST-PRACTICE EXERCISE KEY
Objective 3
Multiplication

1. 15/56
2. 1/3
3. 3/14
4. 1/9
5. 1/3
6. 6
7. 9 2/3
8. 2 5/8
9. 7 1/2
10. 8

POST-PRACTICE EXERCISE KEY
Objective 4
Division

1. 1/2
2. 22 1/2
3. 9
4. 3 1/8
5. 5/54
6. 9/50
7. 8/15
8. 2
9. 14/25
10. 7/16

Module No. 22.201

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

GENERAL COMPETENCIES--OTHER

Instructional Unit:

BASIC MATH

Module Title:

DECIMALS

Prerequisite Module(s):

22.200

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-4

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

Since decimals are used in all business it is very important that you can accurately work with them.

OBJECTIVES:

When you finish this module, you will be able to:

Accurately add, subtract, multiply and divide decimals.

In order to do this, you will:

You will know that you can do this when:

You can (1) add, (2) subtract, (3) multiply and (4) divide decimals with 90 percent accuracy.

If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre-Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

38

(Unless indicated otherwise, go through steps in order listed)

DECIMALS

When we talk about the word decimal, we usually are referring to a number which contains a decimal point. Sometimes it has a digit (a single number) to the right of the decimal point only. Example (Ex. 2): Sometimes there are digits both to the right and to the left of the decimal point. (Ex: 2.2) A number with digits only to the left of the decimal point is a whole number and needs no decimal point.

A decimal is expressed in one or more tenths, hundredths, or thousandths. A digit just to the right of a decimal point is expressed in tenths. Ex: .5 = five-tenths of a unit or $\frac{5}{10}$ of a unit. A digit in the second position to the right of the decimal point is expressed in hundredths of a unit. Ex: .05 = five hundredths of a unit, or $\frac{5}{100}$ of a unit. In the third position, it is expressed in thousandths (.005), etc. Let's see now if you can write some numbers using decimals. Do Problem 1 of the Practice Exercise.

Suppose there is more than one digit to the right of the decimal point. This will tell us whether the number is expressed in tenths, hundredths, etc. Ex: $.43 = \frac{43}{100}$, $.051 = \frac{51}{1000}$; $.404 = \frac{404}{1000}$; $.0002 = \frac{2}{10,000}$.

Now do Problem 2 of the Practice Exercise.

ADDING DECIMALS

When we have a whole number included in the decimal number, that whole number is written to the left of the decimal point. Ex: $2.3 = 2\frac{3}{10}$; $401.02 = 401\frac{2}{100}$.

When adding numbers which include decimals, we must remember one very important rule. The decimal points must be under each other. This will line up the tens, hundreds, thousands, etc. columns both to the right and to the left of the decimal point. Here is how an addition problem should look. Add: 4 + 2.2 + 3.014 + .0081.

$$\begin{array}{r@{.}l} 4 & \\ 2 & 2 \\ 3 & 014 \\ & 0081 \\ \hline 9 & 2221 \end{array}$$

You may have noticed already that it is not necessary to use a decimal point in our first number, 4, because it is simply a whole number.

Now do Problem 3 of the Practice Exercise.

Objective 2

LEARNING ACTIVITIES:

SUBTRACTING DECIMALS

To subtract one decimal from another, the procedure is the same as that followed when subtracting whole numbers. It is important to remember in subtracting that, as in adding, the decimal points must be lined up.

$$\text{Ex: }\begin{array}{r} 3.041 \\ \underline{-1.804} \\ 1.237 \end{array}$$

When subtracting a problem such as this one, what then?

$$\begin{array}{r} 3.041 \\ \underline{-1.00804} \end{array}$$

Because our decimal points are lined up, we now have a subtrahend (1.00804) with more digits to the right of the decimal point than has the minuend (3.041).

We can add as many zeros to the right of the last number in the decimal and it will not change the value of that number. So, 3.041 = 3.04100. Now we have a number we can work with.

$$\begin{array}{r} 3.04100 \\ \underline{-1.00804} \\ 2.03296 \end{array}$$

YOU TRY IT NOW! Do Problem 4 of the Practice Exercise.

LEARNING ACTIVITIES:

Objective 3

MULTIPLYING DECIMALS

When multiplying two numbers involving decimals, there are three steps to follow:

1. Multiply as you would in any problem.

Ex:
$$\begin{array}{r} 5.01 \\ \underline{41.2} \\ 1002 \\ 501 \\ \underline{2004} \\ 206412 \end{array}$$

2. Count the digits to the right of the decimal point in both the multiplier and the multiplicand.

Ex:
$$\begin{array}{rl} 5.01 & \text{(2 digits)} \\ \underline{41.2} & \text{(1 digit)} \\ 206412 & \end{array}$$

3. Add the number of digits together. This total is the number of digits that you count in from the right to place your decimal point.

Ex:
$$\begin{array}{rl} 5.01 & \text{(2 digits)} \\ \underline{41.2} & \text{(1 digit)} \\ 206.412 & \text{(3 digits)} \end{array}$$

NOW: Do Problem 5 of the Practice Exercise.

LEARNING ACTIVITIES:

Objective 4

DIVIDING DECIMALS

Dividing numbers involving decimals is much the same as any other division problem. Only the decimal point changes the procedure. Remember this one important fact: The DIVISOR in a division problem MUST be a WHOLE NUMBER. Let's take a look at a division problem which includes a dividend which is a decimal number.

Ex: $4.2 \div 2 = 2\,\overline{)\,4.2}$. The decimal point in the quotient will be immediately above the decimal point in the dividend. So, $2\,\overset{2.1}{\overline{)\,4.2}}$. The quotient (answer) is 2.1. Do Problem 6 of the Practice Exercises.

Take a look at this problem now.

$45.815 \div 490 = 490\,\overline{)\,45.815}$. We can see that 490 will not go into 458, but it will go into 4581 nine times. So we put the nine in the same place as we would in any other division problem, above the 1. So now we have $490\,\overset{9}{\overline{)\,45.815}}$. Do you see that there is a blank space between the decimal point and the 9 in the quotient? In this space, place a zero. Whenever there is one (or more) blank space between the decimal point and the first digit, place a zero (or zeros) in the blank space (or spaces). So, $490\,\overset{.09}{\overline{)\,45.815}}$. Now we may continue with the problem. $490\,\overset{.093}{\overline{)\,45.815}}$ R. 245.

Objective 4

LEARNING ACTIVITIES:

Since there is a remainder we can continue the problem simply by adding a 0 after 45.815, making it 45.8150, and dividing.

Because the zero is added at the end of a decimal number, it does not change the value of the number. So,

$$490\ \overset{.0935}{\overline{)\ 45.8150}}$$

Now do Problem 7 of the Practice Exercise.

When the divisor is a decimal number, it must first be changed to a whole number before we can divide. In order to keep the values of the numbers the same, we must then change the dividend also. Here is how it's done:

$$\text{Ex:}\quad .625 \div .025 = .025\ \overline{)\ .625}.$$

Move the decimal place in the divisor 3 places to the right so that it is a whole number. So,

$$\underset{\curvearrowright}{.025_{\wedge}}\ \overline{)\ .625}$$

Now move the decimal point in the dividend the same number of places. So,

$$\underset{\curvearrowright\curvearrowright\curvearrowright}{.025_{\wedge}}\ \overline{)\ \underset{\curvearrowright\curvearrowright\curvearrowright}{.625_{\wedge}}}$$

Now we are ready to place the decimal point in the quotient. As we did before, place it immediately above the decimal point in the dividend and divide.

$$\underset{\curvearrowright\curvearrowright\curvearrowright}{.025_{\wedge}}\ \overset{25.}{\overline{)\ \underset{\curvearrowright\curvearrowright\curvearrowright}{.625_{\wedge}}}}$$

The quotient is 25.

NOW YOU ARE AN EXPERT WITH DECIMALS! Do Problem 8 of the Practice Exercise.

Objective 1-4

PRACTICE EXERCISE:

(Write any answers on a separate sheet of paper.)

1. Write the following as decimals:
    a. two tenths
    b. four hundredths
    c. five ten-thousandths
    d. three thousandths

2. Write the following as decimals:
    a. four hundred three thousandths
    b. three ten-thousandths
    c. eighty-four thousandths
    d. one hundredth

3. Add the following:
    a. .894 + 3 + 20.04 + 16 =
    b. 1.006 + .008004 + 150 + .16 =

4. Subtract:
    a. 83.094 - 21.873 =
    b. 14.01 - 6.8031 =

5. Multiply:
    a. 8.02 x .17 =
    b. 250 x .8 =

6. Divide:
    a. .84 ÷ 4 =
    b. 23.2 ÷ 58 =

7. Divide:
    a. .0154 ÷ 7 =
    b. .333 ÷ .9 =

8. Divide:
    a. .03883 ÷ .48 =
    b. .00488 ÷ .086 =

After completing the Practice Exercise, check your work with the Answer Key on page 10 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

PRACTICE EXERCISE KEY

1. a. .2
   b. .04
   c. .005
   d. .003

2. a. .403
   b. .0003
   c. .084
   d. .01

3. a. 39.934
   b. 151.174004

4. a. 61.221
   b. 7.2069

5. a. 1.3634
   b. 200

6. a. .21
   b. .4

7. a. .0022
   b. .037

8. a. .081
   b. .0567

Objective 1-4

PRE-PRACTICE EXERCISE:

(to be completed if student desires or teacher suggests)

DIRECTIONS: Divide the following to three decimal places where necessary. Do your work on the answer sheet.

1. 45.815 ÷ 49 =
2. 23.2 ÷ 58 =
3. 5016.3 ÷ 635 =
4. 423.8 ÷ 5067 =
5. 13 ÷ .4 =
6. 646 ÷ .095 =
7. .154 ÷ .7 =
8. 3.456 ÷ .18 =
9. .15 ÷ 112.5 =
10. 14.14 ÷ 72.8 =

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the steps or activities for this objective or module by going on to the Learning Steps beginning on page 3.

Objective 1-4

POST-PRACTICE EXERCISE:

DIRECTIONS: Divide the following to three decimal places where necessary. Do your work on the answer sheet.

1. 14.14 ÷ 72.8 =
2. .15 ÷ 112.5 =
3. 3.456 ÷ .18 =
4. .154 ÷ .7 =
5. 646 ÷ .095 =
6. 13 ÷ 4 =
7. 423.8 ÷ 5067 =
8. 5016.3 ÷ 635 =
9. 23.2 ÷ 58 =
10. 45.815 ÷ 49 =

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective or module.

PRE-PRACTICE EXERCISE KEY

1) .935

2) .4

3) 7.9

4) .084

5) 32.5

6) 6800

7) .22

8) 19.2

9) .001

10) .194

POST-PRACTICE EXERCISE KEY

1) .194

2) .001

3) 19.2

4) .22

5) 6800

6) 32.5

7) .084

8) 7.9

9) .4

10) .935

Module No. 22.203

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

GENERAL COMPETENCIES--OTHER

Instructional Unit:

BASIC MATH

Module Title:

PERCENTAGES

Prerequisite Module(s):

22.200, 22.201, 22.202

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-5

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

Figuring sales tax, determining a salesperson's commissions, finding discounts on sales merchandise are only a few of the many, many ways in which the concept of "PBR" is used. This is one of the most important mathematical concepts you will need to know for a successful career in the business world.

OBJECTIVES:

When you finish this module, you will be able to:

1. Determine what needs to be found (P, B, or R) and find it.
2. Find the base figure, given the rate and percentage.
3. Find the percentage, given the base and rate.
4. Find the rate, given the percentage and base.
5. Apply to problems.

In order to do this, you will need:

A pencil and paper.

You will know that you can do this when:

You can determine what needs to be found (P, B, or R) and find it in each of the 20 story problems with 90 percent accuracy.

If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

LEARNING ACTIVITIES:

Objective 1

There are always three parts to a percentage exercise.

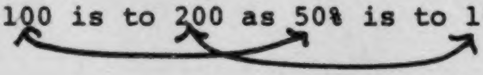
They are:

Base	always equal to 100%. This figure (which is never expressed as a percent, but always represents 100%) is the one to which all others are compared.
Percentage	a figure which represents a part of the base. It is always more than, or less than, 100%, but never equals 100%.
Rate	always expressed as a percent (%). It shows the relationship of the percentage to the base.

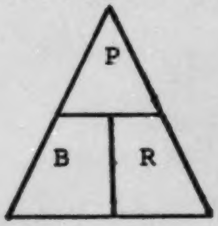
For example: 100 is 50% of 200
Base = 200 (remember, it is equal to 100%)
Percentage = 100 (a part of the base)
Rate = 50%

Notice the relationship between the percentage and the rate.

100 is to 200 as 50% is to 100%



Now, to find any one of the three parts, the other two parts must be known. How do we find any of them? Simply remember this:

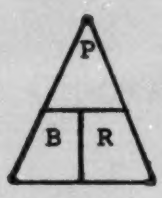


NEXT PAGE, PLEASE . . . . .

LEARNING ACTIVITIES:

Objective 2-3

remember:



Here is how it works:

Do you remember in the module about fractions, the meaning of the line between the numerator and the denominator?

That line means "divided by." Well, in this formula, it means the same thing.

$P \div B = R$ (Percentage ÷ Base = Rate)

$P \div R = B$ (Percentage ÷ Rate = Base)

However, $B \times R = P$ (Base x Rate = Percentage)

Simple enough, right? Now, the most important thing to learn is keeping the Percentage and the Base straight. If you always keep in mind that the base always equals 100%, it will be easier for you to keep them straight.

Now, let's look at a problem.

What amount is 25% of $80?

The first step in finding the answer is to label the parts already given and find which part is missing.

R = 25% (That was easy. The rate is always expressed as a percent.)

B = $80 (This amount represents 100%. How do we know that?

FIND THE ANSWER ON THE NEXT PAGE . . . .

Objective 3

LEARNING ACTIVITIES:

Whenever you see the word "of", you will generally find that the word or figure following it is the base.)

So, now we have:

? is 25% of $80
R B
or
$? is to $80 as 25% is to 100%

Obviously, we are looking for the percentage, or that amount which represents 25% of $80.

So, our formula is:

$$\boxed{B \times R = P}$$

Since B = $80, and R = 25%, then we must first change the percent to a decimal (25% = .25) and then multiply.

So, $80 X .25 = $20

Now B = $80
R = 25%
P = $20 (or $20 is 25% of $80)

Let's look at one more. -------↓

What amount is 30% of $180?
(HINT: Be sure to label the parts already there and decide what part you're looking for.)

B = $180
R = 30%
P = ?

NEXT PAGE FOR ANSWER AND FOR MORE INFORMATION---->

LEARNING ACTIVITIES:

We were again looking for the percentage.
So, $180 X .30 = $54.

Now, turn to the Practice Exercise on page 9 . Work problems 1-3. Check your answers (they are on the following page).

BEGIN HERE AFTER PROBLEMS 1-3.

Now, suppose you were asked this question:

Fifteen is what percent of $60?

First, we must label the parts already given and determine what part is missing.

We know we are looking for the rate. Of the remaining figures, which one is the base? Which one represents 100%? Which one follows the word "of"?

B = 60
R = ?
P = 15

Also, 15 is to 60 as ? is to 100%

The formula needed to find the rate is:

$$\boxed{P \div B = R}$$

So,

15 ÷ 60 = .25 = 25%
Fifteen is 25% of 60.

Let's try another one.--------↓

Twenty is what percent of 25?

B = 25
R = ?
P = 20

ANSWER ON THE NEXT PAGE--->

$20 \div 25 = .8 = 80\%$

So, 20 = 80% of 25

Here's another one:

Fifty is what percent of 40?

B = 40

R = ?

P = 50

$50 \div 40 = 1.25 = 125\%$

Notice in this case that the percentage is more than the base. This sometimes happens. When it does, the rate must be more than 100%. Can you see why?

50 is to 40 as 125% is to 100%

It cannot be overemphasized that the base is ALWAYS equal to 100%, regardless of the size of the percentage.

Now, you try working Problems 4-6 of the Practice Exercises. Turn to the Practice Exercise on page 9. Check your answers.

BEGIN HERE AFTER PROBLEMS 4-6.

When you are looking for the base, remember that you are looking for the amount which represents 100%. The other already known figures, the percentage and the rate, correspond to the base.

Take a look at this problem:

Twenty is 25% of ?

Said another way,

20 is to ? as 25% is to 100%

or

B = ?

R = 25%

P = 20

MORE INFORMATION, NEXT PAGE--->>

LEARNING ACTIVITIES:

Objective 2

Applying the formula, $\boxed{P \div R = B}$

$20 \div .25 = 80$

How about this one:

Twenty-two is 110% of ?

Notice in this case that the rate is more than 100%, so the percentage is more than the base.

So, $22 \div 1.1 = 20$

Now, you do Problems 7-9 of the Practice Exercises. Check your work.

BEGIN HERE AFTER PROBLEMS 7-9.

You have now mastered the techniques of finding any part of the formula, given the other two. But, can you decide for yourself which part is missing and what you must do to find it?

Let's see. Do Problems 10-15 of the Practice Exercise. Check your work after you have completed the problems.

BEGIN HERE AFTER PROBLEMS 10-15.

Before we go on to applying what you have learned in business problems, show your teacher how well you have mastered the basics. Ask your teacher for the Post-Practice Exercise and prove that you've got it all together.

If you were accurate in 9 of the 10 problems, there is no doubt that you understand what you have learned. If you did not do very well, go back and review those types of problems.

Then you may either check with your instructor or go on to the Learning Activities on page 11.

Objective 1-4

PRACTICE EXERCISE:

You are given directions to solve this set of problems as you do the Learning Activities. The answers are on the next page.

Write your answers on a separate sheet of paper.

1. What amount is 10% of $80?
2. What amount is 15% of $300?
3. What amount is 25% of $680?

(After you have checked your answers, return to page 6.)

4. Eight is what percent of 20?
5. Forty is what percent of 60?
6. Twenty-five is what percent of 10?

(After you have checked your answers, return to page 7.)

7. Thirty is 20% of ___?
8. Nine is 3% of ___?
9. Sixty-four is 20% of ___?

(Now check your answers, then return to page 8.)

10. Twenty-five percent of a number is 16. What is the number?
11. What is 80% of 120?
12. Twenty-five is 20% of a number. What is the number?
13. What percent of 50 is 20?
14. What percent of 50 is 60?
15. Find 37½% of 60.

(Now return to page 8.)

ANSWERS TO PRACTICE EXERCISE

1. $8.00
2. $45.00
3. $170.00
4. 40%
5. 66 2/3%
6. 250%
7. 150
8. 300
9. 320
10. 64
11. 96
12. 125
13. 40%
14. 120%
15. 22.5

LEARNING ACTIVITIES:

Objective 1-5

As you can see, all that we have done is to work with "raw" numbers. We will now look at some situations in which you must apply the concepts that you have learned.

Here is a list of hints to help you solve the problems in the Practice Exercise on page 13. Refer to these hints as you work the problems.

1. Do not skim over the words in your search for the numbers. Do read the problem very carefully.
2. Label each part given in the sentence and determine which part you're looking for.
3. Words which will **generally precede the base are**: of; more than; less than.
4. When you see words, rather than figures, following the words of, more than, or less than, those words tell you what the base is in words. Now you must find it in figures.
5. Be sure that the percentage and the rate correspond to each other.
6. When comparing figures which occur at two different times, the figure which occurred first in time is the base. For example, when comparing last year with this year, the base period is last year; three weeks ago with today, it's three weeks ago.

ONLY ONE MORE PAGE------------>

LEARNING ACTIVITIES:

Objective 1-5

7. When you are asked for the rate of increase, remember that your percentage must be the amount of increase.

NOW, YOU ARE GOING TO TRY TO SOLVE THE PROBLEMS IN THE PRACTICE EXERCISE. CHECK YOUR ANSWERS AFTER YOU HAVE COMPLETED YOUR WORK.

PRACTICE EXERCISE:

Objective 1-5

DIRECTIONS: SOLVE THE FOLLOWING PROBLEMS. WRITE ANSWERS ON A SEPARATE SHEET OF PAPER.
CHECK YOUR ANSWERS AFTER COMPLETING THE WORK.

1. Susan is buying a new 10-speed bike. The price is $110. Her father has agreed to pay 25% of the price of the bike. How much must her father pay? How much must Susan pay? (Do not add in the sales tax.)

2. Jim wants to buy a motorcycle. His dad has agreed that if Jim will pay 15% of the price of the motorcycle in cash, he will loan Jim the rest of the money. Jim has saved $125. How much can he afford to pay for the motorcycle?

3. The price of a pound of ground beef was $.72 last year and $.84 this year. What was the rate of increase?

4. Bob receives an allowance of $5 a week. He saves 20% of it. How much does he spend? (NOTE: check hint #5)

5. Barbara earns $2.40 an hour in her office job. This is 20% more than Jane earns as a waitress. How much does Jane earn?

6. Joe earns $2.40 an hour in his maintenance job. This is 10% less than Jack earns at the local theater. What does Jack earn?

CONTINUED ON THE NEXT PAGE . . . .

Objective 1-5

PRACTICE EXERCISE:

7. Last year's taxes on a house were $1,040. This year's taxes were $1,280. What percent were this year's taxes of last year's taxes?

8. Jill received a dividend of $125, which is 5% of her investment. What is the size of the investment?

9. Joe earns a commission of 5% of his total sales. His total sales for the week were $1,020. What was his commission for the week?

10. Last year there were 120 sophomores in the high school. This year, there was a 15% decrease in the number of sophomores. How many are there in this year's class?

CHECK YOUR ANSWERS ON THE NEXT PAGE.

After completing the Practice Exercise, check your work with the Answer Key on page 15 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

ANSWERS TO PRACTICE EXERCISE

1. FATHER, $27.50
   SUSAN, $82.50
2. $833.33
3. 16 2/3%
4. $4.00
5. $1.92
6. $2.64
7. 23%
8. $2500
9. $51.00
10. 102

USE ALSO AS A POST-PRACTICE EXERCISE.

PRE-PRACTICE EXERCISE:

Objective 1-5

(to be completed if student desires or teacher suggests)

DIRECTIONS: SOLVE THE FOLLOWING PROBLEMS, ROUNDING YOUR ANSWER TO TWO DECIMAL PLACES WHERE NECESSARY. WRITE YOUR ANSWERS AND ALL WORK NEEDED TO OBTAIN THE ANSWERS ON A SEPARATE SHEET OF PAPER.
DO NOT WRITE ON THIS SHEET.

1. What is 33% of 2500?
2. Eleven cents is what % of $.15?
3. What percent is 18 of 33?
4. $3.15 is 20% of _____?
5. 84% of $3,600 is _____?
6. 105% of 69 is _____?
7. What % of 80 is 240?
8. 29% is the rate. 58 is the percentage. What is the base?
9. If 29% of a number is 87, what is the number.
10. $7.50 is what percent of $45?
11. A man pays an employment agency a fee of $227.50 from his first month's salary of $700. What percent of the salary is the fee?
12. Steel workers negotiated a new contract in which they received an hourly raise of 27 cents. This raise was 4% of the wages they had been receiving. What was their hourly rate before the new contract?
13. There are 25 students in a class. Twenty percent of that number are girls. How many boys are there in the class?

CONTINUED ON THE NEXT PAGE . . . .

USE ALSO AS A POST-PRACTICE EXERCISE.

Objective 1-5

PRE-PRACTICE EXERCISE:

(to be completed if student desires or teacher suggests)

14. Last year's taxes on a house were $520. This year's taxes were $640. What percent were this year's taxes of last year's taxes?

15. There were 1,250 students in a school. If 725 are boys, what percent are girls?

16. A salesperson sold $275 in goods in one day. With a commission rate of 2 1/2%, what is the earned commission?

17. Joe receives an allowance of $7 per week. He spends 75% of it. How much money does he save?

18. A local clothing store will allow Pete to put a leisure suit on lay-away with a 5% deposit. He has $6 on hand. What is the most he can pay for his suit?

19. Jim's sales for the week were $800, which was 40% more than Joe's sales. What were Joe's sales?

20. Joan's sales for the week were $600, which was 20% less than Terri's sales. What were Terri's sales?

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Steps or Activities for the particular objective. If your score was not high enough, you will want to continue with the steps or activities for this objective or module by going on to the Learning Steps beginning on page 3.

ANSWERS TO PRE-PRACTICE EXERCISE AND POST-PRACTICE EXERCISE

1. 825
2. 73.3%
3. 54.5%
4. $15.75
5. $2924
6. 72.45
7. .03%
8. 200
9. 300
10. 16.66%
11. 32.5%
12. $6.75
13. 20 BOYS
14. 23.08%
15. 58%
16. $6.87
17. $1.75
18. $120.00
19. $480.00
20. $720.00

Module No. 22.205

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

GENERAL COMPETENCIES--OTHER

Instructional Unit:

BASIC MATH

Module Title:

DISCOUNTS

Prerequisite Module(s):

22.203

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-5

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

Cash and trade discounts are an everyday part of doing business to encourage new business and maintain expedient payment of accounts. It is up to the office personnel to figure and record these discounts accurately.

OBJECTIVES:

When you finish this module, you will be able to:

1. find the discount date and the due date of an invoice
2. figure the cash discount amount
3. find the net amount of an invoice after deducting a cash discount and adding freight charges
4. figure trade discounts
5. find the net amount of an invoice after deducting cash and trade discounts

In order to do this, you will:

You will know that you can do this when:

you can find the net amount of an invoice after deducting cash and/or trade discounts seventeen times with 80 percent accuracy.

If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

Objective 1-3

LEARNING ACTIVITIES: CASH DISCOUNT

Businesses like to offer an incentive for paying an invoice (bill) promptly. Therefore, many companies offer a cash discount if the invoice is paid within a certain number of days.

Let's suppose that Wilson Company sells Johnson Company \$100 in merchandise. The terms of the invoice are 2/10, n/30. This means that Johnson Company must pay the entire amount of the invoice, \$100, within 30 days or if it prefers, it can pay within 10 days and deduct 2% of the merchandise amount from the total amount due.

So, Johnson Company will pay \$100 within 30 days OR

$$\begin{array}{r} \$100 \\ \text{X}.02 \\ \hline \$\ \ 2 \end{array} \text{ discount amount} \qquad \qquad \begin{array}{r} \$100 \\ -2 \\ \hline \$\ 98 \end{array}$$

\$98 within 10 days.

Do you know what 2/10, 1/30, n/60 means? You should have said "two percent discount if paid within 10 days or one percent discount if paid within 30 days, or the full amount is due within 60 days."

Now, do Problem 1 of the Practice Exercises for Objectives 1-3, page 8.

After you have finished Problem 1 in the Practice Exercises return to the discussion on the next page.

LEARNING ACTIVITIES:

Objective 1-3

If an invoice is dated May 4, and terms are 2/10, n/30, what is the last date on which the discount can be taken?

If you said May 14, you are right. The last date on which the invoice may be paid is June 3. That is 30 days from May 4.

You can see now that it is important to know how many days there are in each month. Do you remember this from your childhood days?

> Thirty days has September,
> April, June and November . . .

If you can remember that and the fact that February has 28 days (except Leap Years), you will have no trouble in figuring the due date for an invoice. To find the due date when the invoice date is May 4 and the terms are 2/10, n/30:

Days in May	31	
	-4	
	27	Number of days remaining in May
Total days	30	
Days in May	-27	
	3	Days needed in June
Due date:		June 3

Let's try another one:

GO TO PAGE 5 →

LEARNING ACTIVITIES:

Objective 1-3

On an invoice dated August 28, the terms are 3/10, 2/20, n/30. What is the last date on which the 3% discount may be taken?

Days in August	31	
	-28	
	3	Days remaining in August
Total days needed	10	
	-3	
Days needed in Sept.	7	

Date: September 7

Then, of course, the last date on which the 2% discount may be taken is September 17, or 10 days later.

The date on which the invoice must be paid in full is figured by adding another 10 days. That date is September 27.

Suppose the terms were 2/30, n/60 on an invoice dated March 20. What is the last date on which the invoice may be paid?

Days in March	31
	-20
Days remaining in March	11
Days in April	+30
	41
Days needed	60
	-41
Due date:	May 19

ON TO PAGE 6 →

Objective 1-3

LEARNING ACTIVITIES:

NOW, you try Problem 2 of the Practice Exercise for Objectives 1-3, page 8.

After completing the Practice Exercise problem, return to the discussion below.

You are now ready to put it all together. Let's look again at the sale made by Wilson Company to Johnson Company. The merchandise total was $100. The terms were 2/10, n/30. If the date of the invoice is April 2, figure the amount due if the invoice is paid on April 12.

Amount of invoice	$100
Less 2% cash discount	- 2
Amount paid April 12	$ 98

Of course, if the invoice was not paid by April 12, it would have to be paid in full by May 2.

When freight charges are added to the amount due, it is added after the discount has been deducted (if any). There can be no discount on freight or transportation charge.

So, if there is a $5 transportation charge on the Wilson Company's invoice and it is paid within the discount period, the total amount paid is:

$100	Total merchandise	$ 98	
- 2		+ 5	
$ 98		$103	total amount due

LEARNING ACTIVITIES:

Objective 1-3

NOW, do Problem 3 of the Practice Exercises for Objectives 1-3, page 8.

Return to the discussion below after you have completed the Practice Exercise problem.

Did you get all of those right the first time you did them? If you did, you not only understand cash discounts, you also understand the business world's practice of allowing a discount to be taken on the first business day after a weekend or holiday when the discount date falls on the weekend or holiday.

You are now ready for the Post-Practice Exercise for Objectives 1-3. Ask for it from your instructor. GOOD LUCK!!!

Objective 1-3

PRACTICE EXERCISE: CASH DISCOUNT

DO ALL WORK ON AN ANSWER SHEET. DO NOT WRITE ON THIS SHEET.

1. What do these mean?

   (a) 3/10, n/30

   (b) 2/15, 1/30, n/45

   (c) 1½/10, n/25

Check your answers with the key on page 9; then go back to page 4.

2. Find the discount date and the due date in each of the following: (You may assume that it is NOT a leap year.)

   (a) invoice date, January 2; terms, 2/10, n/30

   (b) invoice date, February 14; terms 3/10, n/20

   (c) invoice date, October 16; terms, 1/15, n/30

   (d) invoice date, December 15; terms, 2/20, n/40

Check your answers with the key on page 9; then go back to page 6.

3. Find the amount due in each of the following:

(Mdse. total)	(Invoice date)	(Terms)	(Freight charge)	(Date paid)
(a)$ 213	March 1	2/10, n/30	$ 8	March 15
(b)$ 384	October 3	1/15, n/30	$10	October 18
(c)$1,945	June 4	2/30, n/60		July 5
(d)$ 816	August 10	2/60, n/90	$14	October 10

Check the key on page 9; then return to page 7.

After completing the Practice Exercise, check your work with the Answer Key on page 9 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

KEY: Cash Discounts Objective 1-3

Practice Exercise

---

1. The invoice can be paid either:
    (a) within 10 days with a 3% cash discount or within 30 days in full
    (b) within 15 days with a 2% cash discount or within 30 days with a 1% cash discount or within 45 days in full
    (c) within 10 days with a 1½% cash discount, or within 25 days in full

2.

	Discount Date	Due Date
(a)	January 12	February 1
(b)	February 24	March 6
(c)	October 31	November 15
(d)	January 4	January 24

3. (a) $221
    (b) $390.16
    (c) $1,906.10
    (d) $830

Objective 4-5

LEARNING ACTIVITIES: TRADE DISCOUNT

Many businesses find it economical to send out catalogs with merchandise priced at "list price." These catalogs are sent to all the business' customers. Then a separate sheet is sent to each customer giving the trade discount for that customer. The amount of trade discount depends on the type of customer being dealt with. Usually, a customer who orders huge quantities or who is willing to order a product when it is out of season will receive a higher trade discount.

By sending one catalog, the seller can cut his costs. Separate catalogs for different types of buyers then becomes unnecessary.

Here is how the trade discount works. Suppose a manufacturer offers merchandise with a catalog price (list price) of $150 to Jones Corporation for $150 less a trade discount of 30%.

To find the selling price, simply subtract the amount of the trade discount from the catalog price.

Catalog price	$150
30%=	X .3
Trade discount	$45.0

$150 - 45 = $105 selling price

CONTINUE WITH THE LEARNING ACTIVITY ON THE NEXT PAGE

LEARNING ACTIVITIES:

Let's try another one. Suppose a catalog lists the merchandise at $200. The manufacturer offers a trade discount to a particular buyer of 40%. What is the selling price?

$200 X .4 = $80

$200 - 80 = $120 selling price

NOW, you do Problem 1 of the Practice Exercises for Objectives 4-5, page 16.

After you have finished the problem, return to the discussion below.

There is another advantage of issuing the same catalog to all types of customers than simply sending separate sheets to the customers giving the discount rate for that type of customer. If there is a price change, it is not necessary to print new catalogs; the manufacturer simply sends out another sheet with an additional trade discount.

Let's look again at the manufacturer that sells to Jones Corporation. Through some wise management decisions, the cost of producing certain merchandise is less and the manufacturer naturally wants to pass the savings on to the Jones Corporation. So, Jones Corporation now receives another discount sheet which states that in addition to the 30% trade discount on the type of merchandise that Jones buys, there will be another trade discount of 10%.

MORE ON THE NEXT PAGE

That may look strange to you, but remember one thing. If the manufacturer wants to use one single trade discount for this particular merchandise, all of the various discount sheets for all merchandise would have to be reprinted. For a small number of products, this is too costly. So, instead, the manufacturer simply notifies the customer that in addition to the discount to which it is already entitled, the customer may take another discount. **Here, for Jones Corporation, is how it works:**

Step 1	Catalog price	$150
	less first discount	.3
	trade discount	$45.0

$150 - 45 = $105

Step 2	After first discount	$105
	less second discount	.1
		$10.5

$105 - $10.50 = $94.50

Now the selling price is $94.50. (Be sure to notice that you cannot add the two discounts together to make one discount of 40%). The second discount is figured after you have subtracted the first discount from the catalog price.

MORE ON NEXT PAGE . . . . . .

Objective: 4-5

LEARNING ACTIVITIES:

Here's another example: A manufacturer offers merchandise to a customer at a catalog price of $200 less trade discounts of 45%, 5%. What is the selling price?

Step 1. $200 X .4 = $80 $200 - $80 = $120

Step 2. $120 X .05 = $6 $120 - $6 = $114 selling price

What is the discount amount?

Catalog price	$200
Selling price	- 114
Discount price	$ 86

Here's another one: What is the selling price of merchandise with a catalog price of $160, less trade discounts of 40%, 10%, 5%?

Step 1. $160 X .4 = $40 $160 - 40 = $120

Step 2. $120 X .1 = $12 $120 - 12 = $108

Step 3. $108 X .05 = $5.40 $108 - 5.40 = $102.60

The selling price is $102.60

Now do Problem 2 of the Practice Exercises for Objectives 4-5, page 16.

Return to the discussion on page 15 after you have completed the Practice Exercise problem.

GO ON TO THE NEXT PAGE ⟶

Objective 4-5

LEARNING ACTIVITIES:

Let's put together now what you have learned about cash discounts and about trade discounts. Remember that they are given for different reasons.

The CASH DISCOUNT is an incentive to the customer to pay an invoice within a certain number of days.

The TRADE DISCOUNT is offered to a particular type of customer regardless of when the customer pays the invoice.

Let's look at a problem involving both types of discount:

On June 8, the Smith Book Company bought goods that had a list (catalog) price of $756 with a trade discount of 20% and 10% and terms of 3/10, n/30. Freight in the amount of $8.44 was to be added to the invoice. If the company wishes to pay the invoice within the discount period, how much must the check be written for?

Step 1. $756 X .2 = $151.20; $756 - $151.20 = $604.80

Step 2. $604.80 X .1 = $60.48; $604.80 - $60.48 = $544.32

Step 3. Selling price $544.32
X .02
$10.8864 = $10.89 cash discount

Step 4. $544.32 - $10.89 = $533.43 for merchandise

Step 5. $533.43 + $8.44 = $541.87 amount paid

Objective 4-5

LEARNING ACTIVITIES:

Here's another one:

Catalog price:	$100
Trade discount:	20%, 10%
Terms:	2/10, n/30
Invoice date:	February 1
Date of payment:	February 9

$100 X .2 = $20 $100 - 20 = $80

$80 X .1 = $8 $80 - 8 = $72

$72 X .02 = $1.44 $72 - 1.44 = $70.56, amount paid

Do Problem 3 of the Practice Exercises for Objectives 4-5 , page 16.

Return back to this page after you have completed the Practice Exercise.

You are now ready for the Post-Practice Exercise for Objectives 4-5. As your instructor for it. GOOD LUCK!!!

Objective 4-5

PRACTICE EXERCISE: TRADE DISCOUNT

DO ALL WORK ON **AN ANSWER SHEET.** **DO NOT WRITE ON THIS SHEET.**

1. Find the discount amount and the selling price in the following problems:

	(List Price)	(Trade Discount)
(a)	$ 75	40%
(b)	$ 80	25%
(c)	$120	60%
(d)	$340	55%

After finishing, check key, page 17; then to page 12.

2. Find the selling price in the following problems:

	(List Price)	(Trade Discounts)
(a)	$ 750	25%, 10%
(b)	$ 548	20%, 10%
(c)	$1,812	30%, 05%
(d)	$ 845	25%, 12%
(e)	$ 360.60	40%, 15%, 05%

Check key, page 17; then to page 15.

3. A shoe dealer in Appleton buys some goods with a catalog price of $850 on July 11. His trade discount is 20%, 15%. The terms of the invoice are 3/10, 2/25, n/40. He must add a shipping charge of $5.10. What must he pay if he pays on July 26?

After completing the Practice Exercise, check your work with the Answer Key on page 17 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

KEY: Trade Discounts Objective 4-5

Practice Exercise

1.

	Selling Price	Discount Amount
(a)	$45	$30
(b)	60	20
(c)	48	72
(d)	153	187

2. (a) $506.25

   (b) $394.56

   (c) $1,204.98

   (d) $557.70

   (e) $174.71

3. $571.54

MAY ALSO BE USED AS A PRE-PRACTICE EXERCISE.

Objective 1-3

POST-PRACTICE EXERCISE: CASH DISCOUNTS

Find the amount paid in each of the following cases. Place your answer on a blank sheet of paper. DO NOT WRITE ON THIS PAGE. Answers should be rounded to the nearest cent.

	Mdse. total	Invoice date	Terms	Freight Charge	Date Paid
1.	$17.50	June 18	2/20,n/30		July 15
2.	$1,466	June 30	2/10,n/30		July 10
3.	$478	Feb. 2	2/10,n/30	$10	Feb. 12
4.	$65.16	May 20	3/10,2/20,n/30		May 24
5.	$2,674	July 23	3/30,n/60	$28	Aug. 3
6.	$4,269	May 25	5/10,2/30,n/60	$34.50	June 10
7.	$70	Apr. 30	3/20,n/60		May 25
8.	$5,207	Oct. 19	6/10,3/30,n/90		Nov. 7
9.	$38.58	June 3	3/10,2/20,n/30	$2.10	June 19
10.	$1,184	Apr. 18	2/10,1/30,n/60	$13.41	Apr. 30

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to Objectives 4-5 on page 3.

MAY ALSO BE USED AS A PRE-PRACTICE EXERCISE.

Objective 4-5

POST-PRACTICE EXERCISE: TRADE DISCOUNT

Find the amount paid in each of the following cases. Place your answer on a blank sheet of paper. DO NOT WRITE ON THIS PAGE. Answers should be rounded to the nearest cent.

PART A - 5 points each

	List Price	Trade Discount
1.	$200	20%, 10%, 5%
2.	$800	5%, 10%, 20%
3.	$35.50	5%, 3%
4.	$2,500	15%, 30%, 20%
5.	$326	20%, 10%, 5%
6.	$196	25%, 20%, 10%

PART B - 10 points each

An auto parts dealer in Kenosha purchases some goods with a catalog price of $200 less trade discounts of 20% and 10%. The invoice is dated January 4 and terms are 2/10, n/30. He must also pay the freight charge of $2.10. How much must he pay on January 14?

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective or module.

87

KEY: Cash Discount **Objective 1 - 3**

Pre-Practice Exercise
Post-Practice Exercise

---

1. $17.50
2. $1,436.68
3. $478.44
4. $63.21
5. $2,621.78
6. $4,218.12
7. $70
8. $5,050.79
9. $39.31
10. $1,185.57

Module No. 22.204

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

NUMERICAL DATA HANDLING

Instructional Unit:

BASIC MATH

Module Title:

INTEREST

Prerequisite Module(s):

22.200, 22.202, 22.205

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-2

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

A large amount of business is done on a CREDIT BASIS: the customer takes the goods immediately but doesn't pay for it right away. When this happens, the seller charges the buyer INTEREST during the time when the buyer has the merchandise but hasn't yet paid for it.

OBJECTIVES:

When you finish this module, you will be able to:

1. compute the interest on two given amounts for two given time periods at a given rate
2. find the maturity value (or the number of days held) and the maturity date on a promissory note

In order to do this, you will:

1. need a pencil

You will know that you can do this when:

you can complete five problems in which you must find:

a. the maturity date or the number of days the note is held
b. the interest due at maturity, and
c. the maturity value of the note

If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre-Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

LEARNING ACTIVITIES:

Objective 1

The interest rate for any given problem is ALWAYS the interest rate for ONE YEAR (unless it is specifically written otherwise). This means that when you see an interest rate given, you can assume that it is the ANNUAL interest rate.

In order to find the interest amount, you will follow this simple formula:

$$I = PRT$$

I = Interest

P = Principal amount (the amount on which the interest is figured)

R = Rate of interest

T = Time

If you want to borrow \$100 for one year at an interest rate of 8%, here is how to figure it:

$$I = P \times R \times T$$

$I = \$100 \times 8\% \times 1$ year OR $\$100 \times \frac{8}{100} \times 1 = \$8$

The amount of interest is \$8

LEARNING ACTIVITIES CONTINUE ON THE NEXT PAGE →

LEARNING ACTIVITIES:

Objective 1

Suppose you want to borrow \$100 at 8% for 6 months.

$$I = \$110 \times 8\% \times \tfrac{1}{2} \quad \underline{\text{OR}} \quad \$100 \times \frac{\overset{4}{\cancel{8}}}{100} \times \frac{1}{\underset{1}{\cancel{2}}} = \$4$$

As you can well imagine, the amount of time that money is borrowed is not always for one year or one-half year; so, in order to make the figuring more simple, some businesses use a 360-day year and then find the number of days that the money is to be borrowed. This is called ORDINARY INTEREST.

If a business uses 365 days as the number of days in the year for figuring the interest, it is called EXACT INTEREST. Since the procedure is the same either way, we will use a 360-day year (ordinary interest) for finding the amount of interest to be paid.

So, if the \$100 at 8% is to be borrowed for 90 days, here is what we do:

$$I = 100 \times \frac{8}{100} \times \frac{90}{360} = 2 \qquad \underline{\text{OR}}$$

$$\cancel{\$100} \times \frac{\overset{2}{\cancel{8}}}{\cancel{100}} \times \frac{\overset{1}{\cancel{90}}}{\underset{\cancel{4}\,1}{\cancel{360}}} = \$2$$

Suppose it's for 36 days:

$$I = 100 \times \frac{8}{100} \times \frac{36}{360} = \frac{4}{5} = .80 \quad \underline{\text{OR}} \quad \cancel{\$100} \times \frac{\overset{4}{\cancel{8}}}{\cancel{100}} \times \frac{\overset{1}{\cancel{36}}}{\underset{\cancel{10}\,5}{\cancel{360}}} = \frac{4}{5} = \$\ .80$$

Objective 1

LEARNING ACTIVITIES:

Suppose we borrow \$200 at 6% for 10 days:

$$I = 200 \times \frac{6}{100} \times \frac{10}{360} = \frac{2}{6} = \frac{1}{3} = .33 \quad \underline{\text{OR}}$$

$$\overset{2}{\cancel{\$200}} \times \frac{\overset{1}{\cancel{6}}}{\cancel{100}} \times \frac{\cancel{10}}{\underset{\underset{6}{\cancel{36}}}{\cancel{360}}} = \frac{2}{6} = \frac{1}{3} = \$.33$$

Suppose it's \$200 at 6% for 2 years:

$$I = 200 \times \frac{6}{100} \times \frac{2}{1} = 24$$

$$\overset{2}{\cancel{\$200}} \times \frac{6}{\cancel{100}} \times \frac{2}{1} = \$24$$

Now you try some. Do Part A of the Practice Exercise.

After you have completed Part A of the Practice Exercise, return to the Learning Activities on page 6.

LEARNING ACTIVITIES:

Objective 2

Sometimes the person receiving credit signs a PROMISSORY NOTE, promising to pay the principal amount, or FACE VALUE of the note, plus INTEREST at a given time in the future. Here is what it looks like:

$1,000 Superior, Wisconsin, July 8, 19 —

Sixty Days after date I promise to

pay to the order of J. L. Jeffers

PAYABLE AT MERCHANT'S BANK

One Thousand DOLLARS

Value received with interest at 6%

Due September 22, 19 —

J. L. Williams

In this case, you must review how to find the due date (maturity date) which you learned in DEALING WITH DISCOUNTS.

FOR MORE INFORMATION, TURN PAGE

LEARNING ACTIVITIES:

Objective 2

Suppose John Adams borrows $1,000 at 6% for 60 days on March 4.

We know:

· Maturity value = face value + interest = $1,010.

Face value = $1,000

We must find interest:

$$I = 1{,}000 \times \frac{6}{100} \times \frac{60}{360} = 10 \qquad \underline{\text{OR}}$$

$$\overset{10}{\$\cancel{1{,}000}} \times \frac{\overset{1}{\cancel{6}}}{\underset{1}{\cancel{100}}} \times \frac{\overset{1}{\cancel{60}}}{\underset{\cancel{6}\ 1}{\cancel{360}}} = \$10$$

Date of Note: March 4

Maturity date = ?

We must find the maturity date.

Here is how it's done:

31	days in March
- 4	days in March including date of note
27	days left in March
+ 30	days in April
57	days so far
+ 3	days in May
60	

The due date (maturity date) is May 3.

CONTINUED ON THE NEXT PAGE

LEARNING ACTIVITIES:

Objective 2

Now, let's suppose John Adams borrows $1,000 at 6% on July 17 and the maturity date is October 15. How many days are to be used in computing interest?

31	days in July
-17	days in July including date of note
14	days left in July
31	days in August
30	days in September
15	days in October
90	days to be used in computing interest

Now we can find the interest and maturity value of the note.

$I = PRT$

$$I = 1{,}000 \times \frac{6}{100} \times \frac{90}{360} = 15$$

$$\overset{5}{\cancel{\$1{,}000}} \times \frac{\overset{3}{\cancel{6}}}{\cancel{100}} \times \frac{\overset{1}{\cancel{90}}}{\cancel{360}}{}_{\cancel{4}\ \cancel{2}\ 1} = \$15$$

$I = \$15$

$MV = FV + I$

Maturity Value = $1,000 + $15 = $1,015

Now you are ready for Part B of the Practice Exercise.

If you did well on the exercises, ask your instructor for the Post-Practice Exercise. If you feel you need more help before doing the Post-Practice Exercise, ask your instructor to go over the problems in the Practice Exercise with you.

Objective 1-2

PRACTICE EXERCISE:

DIRECTIONS: Round off all answers to the cent. Do your work on the ANSWER SHEET. DO NOT WRITE ON THIS PAGE.

Part A - Find the interest in each of the following problems:

1. $300 at 8% for 1 year

2. $200 at 4% for 60 days

3. $750 at 6% for 145 days

4. $885 at 4½% for 30 days

5. $2,350 at 8% for 40 days

Part B - Find the amount of interest and the maturity value on each of the following notes. Fill in the time and maturity dates where they do not appear. Assume that the time in none of the problems falls in a leap year.

	Face of Note	Date	Time	Due Date	Int. Rate	Int.	Maturity Value
1.	$425	Oct. 14	?	Nov. 28	6%	?	?
2.	$720	June 12	60 days	?	5%	?	?
3.	$2,468.02	May 30	?	Aug. 10	4%	?	?
4.	$750	Sept. 15	45 days	?	6%	?	?

After completing the Practice Exercise, check your work with the Answer Key on page 11 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

Objective 1-2

ANSWER SHEET

Practice Exercise

Part A

1.

2.

3.

4.

5.

Part B

	Time	Due Date	Interest	Maturity Value
1.				
2.				
3.				
4.				

NOTE TO INSTRUCTOR: This answer sheet must be duplicated and reinserted in the mod each time a student completes this mod.

Objective 1-2

ANSWER KEY

Practice Exercise

Part A

1. $24

2. $1.33

3. $18.13

4. $3.32

5. $20.89

Part B

	Time	Due Date	Interest	Maturity Value
1.	45 days		$3.19	$425.19
2.		August 11	$6.00	$726
3.	72 days		$19.74	$2,487.76
4.		October 30	$5.63	$755.63

MAY ALSO BE USED AS A PRE-PRACTICE EXERCISE.

Objective 1-2

POST-PRACTICE EXERCISE:

DIRECTIONS: Compute the amount of interest due and the maturity value on each of the following notes. Fill in the time and maturity dates where they do not appear. Do all of your work on a separate answer sheet. DO NOT WRITE ON THIS PAGE.

	Face of note	Date	Time	Due Date	Interest Rate	Interest	Maturity Value
1.	$720	Sept. 21	?	Nov. 8	8%	?	?
2.	$42.50	July 14	60 days	?	4½%	?	?
3.	$365	Apr. 22	?	May 10	6%	?	?
4.	$798.20	Nov. 30	75 days	?	8%	?	?
5.	$425	May 17	?	July 5	7%	?	?

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective or module.

Objective 1-2

ANSWER KEY

Pre-Practice Exercise
Post-Practice Exercise

	Time	Date Due	Interest	Maturity Value
1.	48 days		$7.68	$727.68
2.		Sept. 12	$ .32	$42.82
3.	18 days		$1.10	$366.10
4.		Feb. 13	$13.30	$811.50
5.	49 days		$2.89	$427.89

Module No. 22.100

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

GENERAL COMPETENCIES--OTHER

Instructional Unit:

ADDING MACHINE

Module Title:

ADDING MACHINE--10-KEY

Prerequisite Module(s):

BASIC SKILLS IN ADDITION, SUBTRACTION,
MULTIPLICATION, AND DIVISION OF WHOLE NUMBERS

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1-5

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

Many entry level positions in an office require you to use the 10-key adding machine.

The 10-key adding machine ranks high in a list of "top ten" duties performed by general office workers.

General office workers may spend 15% of their time using the 10-key adding machine (working a 40-hour week, this is about 6 hours, nearly one entire day).

With this information in mind, we shall consider it an essential activity to learn the operation of the 10-key adding machine.

OBJECTIVES:

When you finish this module, you will be able to:

1. perform addition.
2. perform subtraction.
3. perform multiplication.
4. perform division.
5. use special keys on 10-key adding machine.

In order to do this, you will need:

1. a 10-key adding machine.

You will know that you can do this when:

you can use the 10-key adding machine to perform addition, subtraction, multiplication, division and use the Special Keys on the 10-key adding machine to find the correct answers to 18 of the 20 problems.

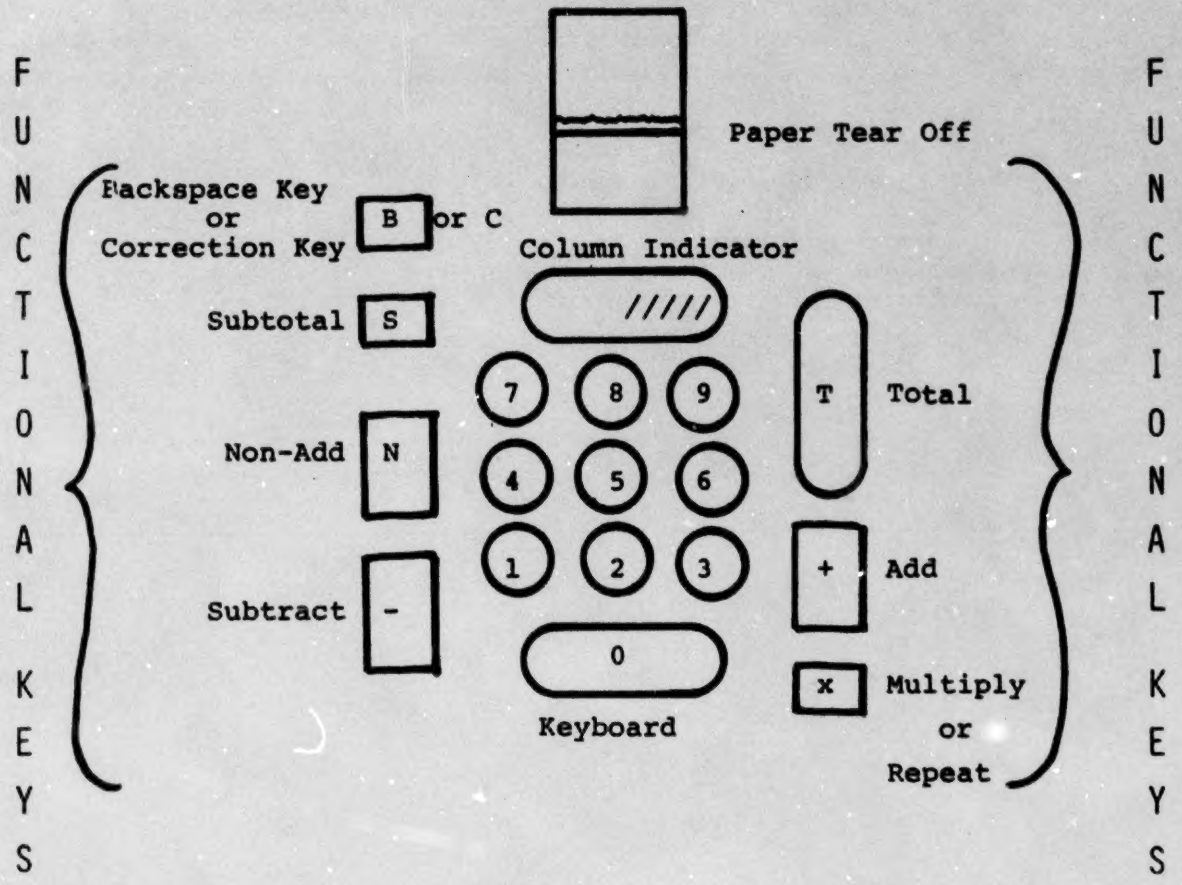
If, after reading the objective(s), you feel you already know the principle(s) or can do the activities described in the objective(s), request the Pre-Practice Exercise from your instructor. If you do well you may be able to skip certain parts or objectives in this mod.

LEARNING ACTIVITIES:

Objective 1

READ this carefully. This information will explain somethings about the adding machine. It is important for you to know this BEFORE you start working on the adding machine.

"sample" 10-Key Adding Machine


FUNCTIONAL KEYS
Paper Tear Off
Backspace Key or Correction Key
B
or C
Column Indicator
/////
Subtotal
S
7
8
9
T
Total
Non-Add
N
4
5
6
1
2
3
+
Add
Subtract
-
0
x
Multiply or Repeat
Keyboard
FUNCTIONAL KEYS

1. Locate these keys on YOUR machine. They may be located in different areas on your machine, so look around. All of the keys are on a 10-key adding machine. If you absolutely cannot locate a key, ask your instructor for assistance.

TURN TO NEXT PAGE FOR MORE LEARNING ACTIVITIES →

Objective 1

LEARNING ACTIVITIES: (continued)

2. TOUCH SYSTEM--the correct way to operate a 10-key adding machine.
   a. The number keys 4, 5, and 6 will be your home-key position.
   b. Your index finger is placed on the 4, and the second and third fingers on the 5 and 6.
   c. Reach your fingers up, one-at-a-time to reach the 7, 8, and 9.
   d. Return your fingers to the home-key position after every stroke.
   e. Reach your fingers down, one-at-a-time to reach the 1, 2, and 3.
   f. Return your fingers to the home-key position after every stroke.
   g. On some machines the home-keys have a deeper groove in the keys--this is to aid you in returning your fingers to the home-keys.
   h. The zero bar (0) is operated with your right thumb.

3. THE FUNCTIONAL KEYS-- Total, add and multiply--on the right of the machine are operated with your little finger. (On YOUR machine, the functional keys which are to the right of the keyboard will be operated with your little finger.)

4. THE FUNCTIONAL KEYS-- Correction, Subtotal, Non-Add, and Subtract--on the left of the machine are operated with your index finger. (On YOUR machine, the functional keys which are to the left of the keyboard will be operated with your index finger.

5. Strike all keys firmly and quickly.

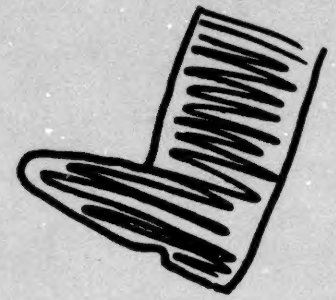
6. If you depress the wrong key and discover your error BEFORE depressing the plus (+) bar, use the correction or backspace key to eliminate the number from the machine.

7. The decimal point is automatically printed on the adding machine in the cents position, i.e., $1.50. If you are using whole numbers, ignore the decimal point. If you are adding decimal numbers, line the decimals properly. If you multiply, or add with decimals, count the decimal places correctly before recording your answer.

LEARNING ACTIVITIES: (continued)

Objective 1

8. Keep this information handy. You may need to refer to it as you are doing the rest of the Learning Activities.



TAKE A GIANT STEP FORWARD

(and onward)

Now you will learn how to operate an adding machine.

When you finish reviewing the information above, go on to the Learning Activities on the next page.

Objective 1-2

LEARNING ACTIVITIES: ADDITION

1. Developing speed and accuracy in touch addition.

   a. Clear your machine. Use your correction or backspace key.

   b. Depress your total key. A T or an * should appear on the right side of your tape. (Some machines must have the total key depressed twice before an answer appears.)

   c. Use the Touch-System. (If you need to be refreshed--see: Learning Activities, page 4.)

   d. DO the Practice Exercise on the next page. DO NOT LOOK AT THE KEYS.

   e. Prepare an answer sheet for the problems.

   --- Name

   --- Time finished __________

   Time started __________

   No. of minutes __________

   --- Number the answer sheet from 1 to 30.

   f. After you have completed the Practice Exercises, fold your adding machine tape and staple it to the upper corner of your answer sheet.

   g. Answers have been provided periodically on some problems in the Practice Exercise. So that you can check your work.

   h. Turn these Practice Exercises in to your instructor.

   i. Do the Self-Check Quiz on page 9 to determine your accuracy addition.

   j. All five problems in the Self-Check Quiz must be accurate, if you have an error, repeat the Learning Steps in Addition.

Objective 1-2

PRACTICE EXERCISE: ADDITION

1.	2.	3.	4.	5.
444	456	465	654	404
555	654	564	465	505
666	456	654	456	606
445	645	564	654	456
554	455	654	564	450
445	466	564	465	540
545	554	546	654	650
665	665	654	654	640
664	664	465	546	506
446	564	546	645	605
				5362

6.	7.	8.	9.	10.
506	405	645	754	756
605	540	456	457	675
506	650	564	567	567
504	460	645	457	674
406	540	556	745	574
605	650	456	467	754
504	440	544	457	547
506	550	645	574	576
405	660	644	754	674
465	650	566	547	756
				6553

11.	12.	13.	14.	15.
675	576	754	865	584
674	675	657	586	448
745	576	567	648	648
475	756	765	586	568
457	457	457	685	468
577	567	675	548	658
754	674	674	648	854
547	576	574	586	584
567	675	475	685	684
675	657	745	458	486
				5982

MORE PROBLEMS NEXT PAGE

Objective 1

PRACTICE EXERCISE: ADDITION (continued)

16.	17.	18.	19.	20.
875	854	658	659	954
478	586	458	596	679
687	784	568	965	869
768	847	485	456	479
876	756	586	569	649
487	674	448	695	859
587	475	478	896	759
785	567	586	589	659
857	456	456	586	569
687	856	648	659	469
				6945

21.	22.	23.	24.	25.
978	594	596	154	4720
649	894	459	741	5920
769	479	897	571	2910
849	957	945	154	6420
459	679	596	415	4620
895	798	679	841	2960
659	968	649	541	6270
549	489	895	751	6250
869	974	459	871	8520
689	897	965	481	9820
				1280
				6240
				65930

26.	27.	28.	29.	30.
7602	1620	5602	4702	6350
7502	2460	2405	7206	9063
5209	7620	5208	1260	3056
6209	1270	9520	5206	8036
2409	8420	2504	4270	2063
2701	6210	5201	5920	3065
7902	2410	1602	7502	8063
5208	1420	5209	2460	7063
8290	2740	5109	2405	9053
8702	2670	5802	7206	8036
1092	4250	2601	2901	4045
2407	8620	4208	5209	67893

When completed, go back to item "f," p. 6.

Objective 1-2

ADDITION SELF-CHECK QUIZ:

Compute the correct answers for the following 5 problems. After you have added these problems (using the touch-system and NO looking at the keys), check your answers with those at the bottom of this page.

1.	2.	3.	4.	5.
6310	1803	6540	4587	8746
9603	8956	9765	8090	3492
6530	9013	1009	1876	2876
8769	2549	2365	4318	2547
1009	4297	4321	5618	1901
6549	6470	6540	3476	7890
8746	9081	7980	9065	5601
3246	1653	5876	2479	5634
9865	1254	3209	8654	4327
1065	7019	5437	3687	8432
3245	4500	9870	1875	8645

ANSWERS: 1. 64937   2. 56595   3. 62912
4. 53725   5. 60081

If all the problems are not correct, repeat the Learning Activity for Addition. If all of your problems are correct, go on to the next Learning Activity for Subtraction.

Continue with the next Learning Activity.

Objective 1-3

LEARNING ACTIVITIES: SUBTRACTION (continued)

1. Developing speed and accuracy in subtraction.

   a. Clear your machine. Depress the total key.

   b. Example: 31 Enter 31, depress the add key, enter 6,
   -6 depress the subtract key.

   Take a total in the usual way. (Some machines require you to depress the subtract (-) key and then the add (+) key before subtraction will occur.)

   c. If you make an error and have already depressed the (+) key, you may enter the number (the wrong number) a second time, subtract it and then enter the correct number.

   d. DO the Practice Exercise on the next page. DO NOT LOOK AT THE KEYS.

   e. Prepare an answer sheet for the problems.

   --- Name

   --- Time finished ________

   Time started ________

   No. of minutes ________

   --- Number the answer sheet from 1 to 20.

   f. After you have completed the Practice Exercises, fold your adding machine tape and staple it to the upper corner of your answer sheet.

   g. Answers have been provided on some problems in the Practice Exercise. So that you can check your work.

   h. Turn these Practice Exercises in to your instructor.

   i. Do the Self-Check Quiz on page 13 to determine your accuracy in subtraction.

   j. All five problems in the Self-Check Quiz must be accurate, if you have an error, repeat the Learning Steps in Subtraction.

Objective 1-3

PRACTICE EXERCISE: SUBTRACTION

1. 3754 -1250	2. 9978 -1043	3. 17750 -8802	4. 58535 -10201
5. 47310 -12354 34956	6. 9150 -7313	7. 6480 -2880	8. 12795 -1854
9. 17455 -6981	10. 73861 -4075 69786	11. 19159 -7311	12. 16481 -2882
13. 12796 -1854	14. 26496 - 4210	15. 14244 -2795 11449	

In the following problems you have a sample of an "error" in an addition column. After the incorrect number has been entered in the machine, it must be entered again, but this time the subtract key must be depressed. After you have done this, enter the correct number. Then continue with the problem.

16.	17.	18.
1863	8310	10967
6289	8764	87292 Er.
6700	8409	87292 -
1547 Er.	1976	91065
1547 -	4321	65398
7654	9008	26410
8541	1178 Er.	76510
9420	1178 -	40651
1943	3905	24763
2709	6520	87490

MORE PROBLEMS ⟶ NEXT PAGE ⟶

PRACTICE EXERCISE: SUBTRACTION (continued)

Objective 1-3

19. 7984
861
975
54378
5876
32876 Er.
32876 -
659
97011
15672

20. 8645
436
34789
54
378
45322
5689
444 Er.
444 -
97340

192653

Back to Learning Activity "f," page 10.

SUBTRACTION SELF-CHECK QUIZ:

Compute the correct answers for the following 5 problems. After you have subtracted these problems (using the touch-system and NO looking at the keys), check your answers with those at the bottom of this page.

1. 43185
-27375

2. 13893
- 7181

3. 73206
-38130

4. 26892
- 3108

5. 86092
-51691

ANSWERS: 1. 15810 2. 6712 3. 35076
4. 23784 5. 34401

If all problems are not correct, repeat the Learning Activity for Subtraction. If all of your problems are correct, go on to the next Learning Activity for Special Keys.

Continue with the next Learning Activity.

Objective 1-5

LEARNING ACTIVITIES: SPECIAL KEYS

1. Procedure for using Special Keys on the 10-key adding machine.

   a. Non-Add Key

      1) The non-add key is depressed when a number is to be recorded, but is not to be added.

      2) Enter your number, depress the N key.

      3) It can be used to number the problems you are doing.

      4) It can be used to record an employee number or a merchandise number, before adding other information.

      5) DO the Practice Exercise on the next page. DO NOT LOOK AT THE KEYS.

   b. Subtotal Key

      1) The subtotal key is used if you want to obtain a total of the items listed up to a certain point, without clearing the machine.

      2) Enter 4 numbers, depress S, the "total" of those 4 numbers is listed with a S to the right of the number. Continue to enter numbers until another total is needed, depress S if it is another subtotal. After the entire column is entered in the machine, depress the total key, this will give you a total of ALL items in that column.

      3) Some machines print the subtotal in red.

      4) Some machines require you to depress the subtotal key and then the add key.

      5) DO the Practice Exercise. DO NOT LOOK AT THE KEYS. Problems 6-10 use the subtotal key.

   c. Prepare an answer sheet for the problems.

--- Name

--- Time finished __________

Time started __________

No. of minutes __________

Objective 1-5

LEARNING ACTIVITIES: SPECIAL KEYS (continued)

--- Number the answer sheet from 1 to 10.

d. After you have completed the Practice Exercises, fold your adding machine tape and staple it to the upper corner of your answer sheet.

e. Answers have been provided periodically on some problems in the Practice Exercise. So that you can check your work.

f. Turn these Practice Exercises in to your instructor.

g. Do the Self-Check Quiz on page 18 to determine your accuracy with Special Keys.

h. All five problems in the Self-Check Quiz must be accurate, if you have an error, repeat the Learning Activity for the Special Keys.

Objective 1-2-5

PRACTICE EXERCISE: NON-ADD KEY

Number all of these problems on your adding machine tape using the non-add key.

1. 15050
32276
8754
5876N
40971
65380
275
56093
42109
710
3875
333N

2. 10494N
765
3876
65431
65
4587
198N
43985
6538
87
349
90097

3. 11390
785
3790
56471N
571
8062
27590
475
809
4329N
178
4576

4. 19400N
876
8743
109
36541
8456
134
5432
50910
432
8640N
320

5. 98475
751
4310N
76342
109
3764
8634N
86541
908
4329
17864
35698

324781

On your answer sheet, record each Subtotal for the following problems along with the total.

6. 59902
10300
47450
89025
6717
907
5419
37650
S
8764
26390
198
3619
26374
1009
362
7584
9854
62534
T

7. 12333
4652
376509
1785
907
S
976013
9837
76342
145
S
4590
623801
456
90743
1893
77445
837423
T

MORE PROBLEMS - NEXT PAGE →

PRACTICE EXERCISE: NON-ADD KEY (continued)

8. 82405
702
17645
5420
3450198
34987
48751
2980

S
67901
378901
984356
765
2678
35709
3786
9674
87432
9087
238791

S
89765
287651
9054
387
98754
901
432890

T

9. 3030
85640
239870
1976
349
3890
11747
3876
763509
5329
88764
376501

S
54905
1964
239084
3765
43908
432

T

10. 98756
901
34687
3287
438
32853
9999

180921 S
765
3529
18642
987
3529
87632
9803
63728
184
3762
372

373854 T

When completed, go back to Learning Activity "d," p. 15.

SPECIAL KEYS SELF-CHECK QUIZ:

Compute the correct answers for the following 5 problems. After you have completed these problems, check your answers with those at the bottom of this page.

-- Number all problems, using your Non-Add key.

```
1.  16246      2.  11067      3.  3575      4.  1694
     1106          75750          5537          2950
      468           2695          3656          6653
    30995           5583         ------        ------
     9575N         38905               S             S
      962            486N         2765          7733
    41477          44016          6824          1595
       20           3615          7607          8706
     3152N         50825          5159          6482
    68823           4920         ------        ------
      735             36N              S             S
       95          51078          4592          5906
   ------         ------          6750          6374
                                  9832          4295
                                  3896          9173
                                  9542         ------
                                  7910               S
                                  4650          5803
                                 ------         4062
                                       T       ------
                                                     T

5.  19405
    29583
    17578
    38512
    77456
   ------
         S
    20506
    53487
   ------
         S
    26061
    53460
    45231
   ------
         T
```

```
ANSWERS:  1. 160927          2. 288454          3.  S 12768
          4.  S 11297        5.  S 182534           S 35123
              S 35813            S 256527           T 82295
              S 61561            T 381279
              T 71426
```

If all problems are correct, go on to the next Learning Activity for Multiplication. If you have a mistake, repeat the Learning Activity for the Special Keys.

Continue with the next Learning Activity.

Objective 1-3

LEARNING ACTIVITIES: MULTIPLICATION (continued)

1. Procedure for using the multiplication key (or, sometimes, the repeat key).

With the coming of the electronic calculator, adding machines are not used as much for multiplication and division. You should know how to multiply and divide, but you will probably not do A LOT of this on an adding machine.

a. Locate the multiply (x) key or the repeat (R) key on your machine.

b. Number each problem on the adding machine tape using the non-add key.

c. Clear the machine before beginning all problems.

d. To multiply: 456 x 34 =

1) Enter 456
2) Depress (x) key 4 times (for the 4 in 34)
3) Depress 0 key, moving number 456 one column to the left and aligning it with the number 3 (in 34)
4) Depress (x) key 3 times (multiplying the 3 in 34)
5) Depress the clear key (to clear all numbers)
6) Depress the total key
7) Your total should be: 15504
8) For every digit in the multiplier (34 above) depress one more zero and proceed to multiply as you did in steps 3 and 4.

e. Prepare an answer sheet for the problems.

--- Name

--- Time finished __________

Time started __________

No. of minutes __________

--- Number the answer sheet from 1 to 10.

f. DO the Practice Exercises on page 21.

g. Some machines require you to "latch" or "lock" a repeat (R) key and then depress the (+) key. (The same procedure is used for the actual multiplying.)

Objective 1-3

LEARNING ACTIVITIES: MULTIPLICATION (continued)

h. After you have completed the Practice Exercises fold your adding machine tape and staple it to the upper corner of your answer sheet.

i. Answers have been provided periodically on some problems in the Practice Exercise. So that you can check your work.

j. Turn these Practice Exercises in to your instructor.

k. Do the Self-Check Quiz on page 22 to determine your accuracy in Multiplication.

l. All five problems in the Self-Check Quiz must be accurate, if you have an error, repeat the Learning Activity for Multiplication.

Objective 1-3

PRACTICE EXERCISE: MULTIPLICATION

1. 456 x 34 = ____________
2. 123 x 42 = ____________
3. 375 x 37 = ____________
4. 498 x 35 = ____________
5. 256 x 245 = 62720
6. 451 x 918 = ____________
7. 964 x 695 = ____________
8. 259 x 379 = ____________
9. 489 x 124 = ____________
10. 148 x 234 = 34632

When completed, go back to Learning Activity "h," p. 20.

MULTIPLICATION SELF-CHECK QUIZ:

Compute the correct answers for the following 5 problems. After you have completed these problems, check your answers with those at the bottom of this page.

-- Number all problems, using your non-add key.

1. 689 x 598 = ________________

2. 312 x 735 = ________________

3. 432 x 531 = ________________

4. 727 x 865 = ________________

5. 131 x 456 = ________________

ANSWERS: 1. 412022 2. 229320 3. 229392
4. 628855 5. 59736

If all problems are correct, go on to the next Learning Activity for Division. If you have a mistake, repeat the Learning Activity for Multiplication.

Continue with the next Learning Activity.

Objective 1-4

LEARNING ACTIVITIES: DIVISION (continued)

1. Procedure for Division.

Division like multiplication can be completed much more accurately and quickly on the electronic calculator. You may have to do it at sometime. Therefore, you will learn the procedure for doing division.

If you are doing a great deal of division, you must obtain a "Reciprocal Table." The divisor is listed in this table, with a reciprocal next to it. To obtain a reciprocal, you can divide the number (the divisor) by 1. For the problems you will do, the reciprocal will be listed.

a. Clear the machine.

b. To divide: 1800 ÷ 200 (reciprocal .005) (the divisor is 200)

  1) Enter 1800
  2) Multiply 1800 by 5 (depress the (x) key 5 times)
  3) Since the other figures are zero, you do not multiply any more
  4) Depress the clear key (to clean all numbers)
  5) Depress the total key
  6) Your total should be: 900
  7) Ignore the decimal point which the adding machines print. Figure where the decimal point should be for YOUR machine.

c. DO the Practice Exercises.

d. Prepare an answer sheet for the problems.

--- Name

--- Time finished __________

Time started __________

No. of minutes __________

--- Number the answer sheet from 1 to 20.

e. After you have completed the Practice Exercises fold your adding machine tape and staple it to the upper corner of your answer sheet.

f. Answers have been provided periodically on some problems in the Practice Exercise. So that you can check your work.

Objective 1-4

LEARNING ACTIVITIES: DIVISION (continued)

g. Turn these Practice Exercises in to your instructor.

h. Do the Self-Check Quiz on page 26 to determine your accuracy in Division.

i. All five problems in the Self-Check Quiz must be accurate. If you have an error, repeat the Learning Activity for Division.

Objective 1-4

PRACTICE EXERCISE: DIVISION

1. 1429 ÷ 200 = ______________
   Reciprocal is .005

2. 670 ÷ 25 = ______________
   Reciprocal is .04

3. 4187 ÷ 500 = ______________
   Reciprocal is .002

4. 823 ÷ 40 = ______________
   Reciprocal is .025

5. 792 ÷ 20 = 39.6
   Reciprocal is .05

6. 622 ÷ 80 = ______________
   Reciprocal is .0125

7. 6292 ÷ 400 = ______________
   Reciprocal is .0025

8. 8748 ÷ 800 = ______________
   Reciprocal is .00125

9. 768 ÷ 50 = ______________
   Reciprocal is .02

10. 7219 ÷ 250 = 28.876
    Reciprocal is .004

When finished, go back to Learning Activity "e" on page 23.

DIVISION SELF-CHECK QUIZ:

Compute the correct answer for the following 5 problems. After you have completed these problems, check your answers with those at the bottom of this page.

-- Number all problems, using your non-add key.

1. 194 ÷ 80 = ____________

   Reciprocal is .0125

2. 361 ÷ 40 = ____________

   Reciprocal is .025

3. 4963 ÷ 800 = ____________

   Reciprocal is .00125

4. 776 ÷ 200 = ____________

   Reciprocal is .005

5. 5132 ÷ 500 = ____________

   Reciprocal is .002

ANSWERS: 1. 2.425 2. 9.025 3. 6.2038
4. 3.88 5. 10.264

If you have an error in your problems, repeat the Learning Activity for Division.

If the Self-Check Quiz is correct, check with your instructor. Your instructor will either recommend more practice or that you take the Post-Practice (final) Exercise.

Objective 1-5

PRE-PRACTICE EXERCISE:

(to be completed if student desires or teacher suggests)

DIRECTIONS:

1. You will need a separate sheet of paper to record your answers. Prepare this paper now.

   a) Write your name.

   b) Number your answers for this 1 to 20.

   c) Record the time it takes you to complete the Exercise:

   Time finished ____________________

   Time started ____________________

   No. of minutes ____________________

2. Clear your adding machine before starting your work.

3. After you have completed the Exercise, fold your adding machine tape and staple it to the upper corner of your answer sheet.

4. Number each problem on the adding machine, using your Non-add key.

CONTINUED →

Objective 1-3.5

PRE-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

(to be completed if student desires or teacher suggests)

1.
201773
483920
473642
483672
120395
647157
528509
019472
758472
758594
849501
746293
958473
855012
837410
474235
475830
374866
847562
574635
475632
865432
890764
476890
654318
568019
654390
653901
574632
403829
____
T

2.
74859
87374N
28679
95847
85746
90814
____
S
88374
46352
13948
37265
37465
65743
93847
13849
37465
84736
____
S
85736
36472
13948
36254
38492
37859
98472
____
S
84732
57621
____
T

3.
83897
-46352
____

4.
84932
-14938
____

5.
45320
-13725
____

6.
94731
-37264
____

7.
89302
-74321
____

8.
74632
-11345
____

9.
936
-171
____

10.
746
-345
____

11.
6837
-463
____

12. 5814 x 378 = ____________

13. 4736 x 73 = ____________

Objective 1-3,4

PRE-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

(continued)

(to be completed if student desires or teacher suggests)

14. 7483 x 76 = ____________

15. 8743 x 456 = ____________

16. 923 x 125 = ____________

17. 838 ÷ 80 = ____________

Reciprocal is .0125

18. 582 ÷ 500 = ____________

Reciprocal is .002

19. 853 ÷ 25 = ____________

Reciprocal is .04

20. 3452 ÷ 138 = ____________

Reciprocal is .00724637

To find out how well you did, check with your instructor. If you did well, you will not need to go through the Learning Activity for that particular objective. If your score was not high enough, you will want to continue with the activities for this objective. Your instructor will discuss this with you.

Objective 1-5

POST-PRACTICE EXERCISE:

DIRECTIONS:

1. You will need a separate sheet of paper to record your answers. Prepare this paper now.
   - a) Write your name.
   - b) Number your answers for this 1 to 20.
   - c) Record the time it takes you to complete the Exercise:

     Time finished ____________

     Time started ____________

     No. of minutes ____________
2. Clear your adding machine before starting your work.
3. After you have completed the Exercise, fold your adding machine tape and staple it to the upper corner of your answer sheet.
4. Number each problem on the adding machine, using your Non-add key.

Objective 1-4

POST-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

1.	2.	3.	4.
656	475	5115	47839
843	475	7543	90148
901	149	8754	23549
481	593	9989	19087
365	905	9011	83721
394	475	3624	49382
123	673	4732	49020
476	463	5938	41903
674	214	9011	38572
483	859	3847	37821
674	490	4738	73847
906	374	7463	83750
475	485	9041	14892
475	149	7532	14758
354	114	4657	16284
680	473	4532	84720
809	278	1938	58382
137	382	1372	96870
341	928	3815	90012
458	380	7213	84725
463	385	1385	68273
458	593	3902	38920
463	903	1385	28396
485	128	3629	39208
593	839	3920	98273

5.	6.	7.	8.	9.
78453	7483	47801	473626	9875
-35487	-1847	-34567	-48573	-130

10. 1390 x 403 = ____________

11. 3094 x 87 = ____________

12. 946 x 140 = ____________

13. 567 x 43 = ____________

14. 336 x 789 = ____________

15. 323 x 57 = ____________

16. 954 ÷ 80 = ____________

Reciprocal is .0125

17. 606 ÷ 25 = ____________

Reciprocal is .04

POST-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

Objective 1-5
(continued)

18. 1900 ÷ 500 = ____________

Reciprocal is .002

19. 545 ÷ 40 = ____________

Reciprocal is .025

20.
491019
103247
253034
87640
5643
98
65410
654320
1897
76410
349801
1765
1765
45980
S
859403
1493
4950
473921
483
90183
4839
129385
14782
4890
11993
493
90
365098
S
7845
98310
904

849305
4903
49
473829
495
3859
90041
S
8904
199043
190
48732
419
984763
419
4732
123
48920
763523
T

Check in with your instructor when you are finished. If the Post-Practice Exercise shows that you met the minimum requirements, you may then go on to the next objective or module.

ANSWERS FOR PRACTICE EXERCISE: ADDITION

1. 5429
2. 5579
3. 5676
4. 5757
5. 5362
6. 5012
7. 5545
8. 5721
9. 5779
10. 6553
11. 6146
12. 6288
13. 6343
14. 6295
15. 5982
16. 7087
17. 6855
18. 5371
19. 6670
20. 6945
21. 7365
22. 7729
23. 7140
24. 5520
25. 65930
26. 65233
27. 49710
28. 54971
29. 56247
30. 67893

ANSWERS FOR PRACTICE EXERCISE: SUBTRACTION

1. 2504
2. 8935
3. 8948
4. 48334
5. 34956
6. 1837
7. 3600
8. 10941
9. 10474
10. 69786
11. 11848
12. 13599
13. 10942
14. 22286
15. 11449
16. 45119
17. 51213
18. 423254
19. 183416
20. 192653

ANSWERS FOR PRACTICE EXERCISE: SPECIAL KEYS

1. 265493

2. 215780

3. 58226

4. 111953

5. 324781

6. S 257370
   T 404058

7. S 396186
   S 1458523
   T 3094874

8. S 3643088
   S 5462168
   T 6381570

9. S 1584481
   T 1928539

10. S 180921
    T 373854

ANSWERS FOR PRACTICE EXERCISE: MULTIPLICATION

1. 15504
2. 5166
3. 13875
4. 17430
5. 62720
6. 414018
7. 669980
8. 98161
9. 60636
10. 34632

ANSWERS FOR PRACTICE EXERCISE: DIVISION

1. 7.145
2. 26.8
3. 8.374
4. 20.575
5. 39.6
6. 7.775
7. 15.73
8. 10.935
9. 15.36
10. 28.876

ANSWERS FOR PRE-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

1. 17687230
2. S 375945
   S 894989
   S 1242222
   T 1384575
3. 37545
4. 69994
5. 31595
6. 57467
7. 14981
8. 63287
9. 765
10. 401
11. 6374
12. 2197692
13. 345728
14. 568708
15. 3986808
16. 115375
17. 10.475
18. 1.164
19. 34.12
20. 25.015

ANSWERS FOR POST-PRACTICE EXERCISE: PROBLEMS TO BE COMPUTED

1. 13167
2. 12182
3. 134086
4. 1372352
5. 42966
6. 5636
7. 13234
8. 425053
9. 9745
10. 560170
11. 269178
12. 132440
13. 24381
14. 265104
15. 18411
16. 11.925
17. 24.24
18. 3.8
19. 13.625
20. S 2138029
    S 4100032
    S 5629572
    T 7689340

Module No. 12.113

STATE OF WISCONSIN

BUSINESS EDUCATION CURRICULUM

Major Instructional Area:

NUMERICAL DATA HANDLING

Instructional Unit:

Module Title:

CALCULATE DEPRECIATION BY METHODS OTHER THAN STRAIGHT LINE

Prerequisite Module(s):

Occupations Requiring This Module:

WHY IS IT IMPORTANT TO LEARN WHAT IS INCLUDED IN THIS MODULE?

Objective 1,2

Business and industry have reported that it is important for office workers to know or to be able to do the following things. Take your time. Read very carefully.

Business must acquire, depreciate, and replace certain items in the daily operation of the company. Secretaries who have a basic understanding of depreciation methods will be able to help communicate in areas dealing with this important financial concern.

OBJECTIVES:

When you finish this module, you will be able to:

1. Define depreciation terms necessary to compute depreciation and explain advantages of different depreciation methods.
2. Compute depreciation by sum-of-years digits, double-declining balance, and units of production methods.

In order to do this, you will:

Need to study the materials and terms found in this module. Also, you will need to do the practice material given here.

You will know that you can do this when:

You can pass the post-practice with ninety percent accuracy.

GO ON TO THE LEARNING ACTIVITIES ON THE NEXT PAGE

LEARNING ACTIVITIES:

Objective 1

THINGS YOU NEED TO KNOW--

Buildings, machinery, and other such items are a tangible fixed asset used in the operation of a business. They are not intended for sale--therefore, they are subject to depreciation (an expense charged against business profits).

In accounting records, fixed assets are recorded at their original cost (all expenses for acquiring and putting into use).

The purpose of depreciation is to place a portion of the cost over the years of use.

A depreciation policy is a specific method of assigning asset costs to the accounting periods benefited. Therefore, the cost of fixed assets is matched against revenue (money taken in by the business).

Several facts are considered when determining the depreciation expense.

1. Cost (all expenses for acquiring and putting into use)
2. Estimated salvage value (what an asset will be worth after it has been used for a number of years)
3. Estimated life (the number of years it is believed an asset will be usable)

The following are the most common methods of depreciation:

1. straight-line
2. sum-of-years-digits
3. double declining balance
4. units of production

In this module, you will be working with the last three methods. You will study straight-line in another module.

After you have studied this material and the terms on the next page, be prepared to take a quiz on terms--as you study them, really think them through and try to understand them.

NOW, ON TO THE TERMS - - - -

LEARNING ACTIVITIES:

Objective 1

TERMS

1. Depreciation - loss of usefulness of fixed assets with the passage of time. Causes of depreciation include wear and tear, inadequacy, and obsolescence.

2. Tangible fixed assets - assets with a useful life extending beyond the current business year.

3. Accounting period - the space of time covered by a report on the sales, expenses, and profits of an organization.

4. Estimated salvage value - the amount an asset will be worth after it has been used for a given number of years

5. Estimated life - the number of years it is believed an asset will be usable

6. Straight-line depreciation - take the cost of an asset and subtract the estimated salvage and divide by the number of years of estimated life or

$$\frac{\text{cost - salvage}}{\text{life}}$$

7. Sum-of-years digits - this method provides for a progressively declining depreciation charge and is calculated in the following manner:

   a. A fraction is computed for a given year.
   b. The numerator is the number of years of remaining asset life at the beginning of the accounting period.
   c. The denominator is the sum total of years for all accounting periods.

8. Double-declining balance - this also provides for increased depreciation charges in the earlier years of the asset's life. In this method:

   a. double the straight line rate.
   b. change it to a percentage.
   c. each time - apply the percentage to the balance remaining in the account.

Objective 1

LEARNING ACTIVITIES:

9. Units of production - this method attempts to relate the expired cost to production units rather than time periods. You take the cost less salvage value and divide it by the number of estimated units of production in a given year.

$$\frac{\text{cost - salvage value}}{\text{units of production}}$$

10. Cost - fixed assets are recorded at their cost, which includes all expenditures related to acquiring and placing in location for operation.

11. Book value - the cost minus the depreciation taken up to that time.

A QUIZ ON TERMS FOLLOWS - ARE YOU READY?

If not, review them once more.

ON TO THE NEXT PAGE

145

OBJECTIVE 1

MATCH THE FOLLOWING (record answers on another sheet of paper)

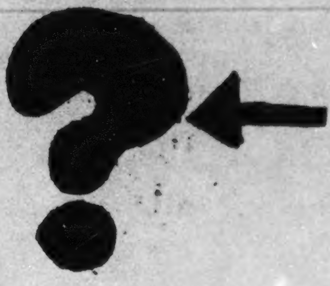
1. loss of usefulness of fixed assets with the passage of time
2. assets with a useful life extending beyond the current business year
3. the space of time covered by a report on the sales, expenses, and profits of an orgnization
4. the amount an asset will be worth after it has been used for a given number of years
5. the number of years it is believed an asset will be usable
6. all expenditures related to acquiring an asset and placing it in location and operation
7. when you take the cost of an asset and subtract the estimated salvage and divide by the number of years of estimated life
8. this method relates the expired cost of the production units rather than time periods
9. this method provides for a progressively declining depreciation charged based on the number of years it is expected an asset will last--a fraction is computed for the given year.
10. this method provides for increased depreciation in the earlier years or double the straight-line percentage with no salvage being considered--the percentage is always applied to the balance.
11. the cost minus the depreciation taken up to that time

a. accounting period
b. book value
c. cost
d. depreciation
e. double-declining balance
f. estimated life
g. estimated salvage
h. straight-line
i. sum-of-years digits
j. tangible fixed assets
k. units of production

SELF-CHECK: NEXT PAGE

KEY TO QUIZ -

1. d
2. j
3. a
4. g
5. f
6. c
7. h
8. k
9. i
10. e
11. b



Did you do well?

If not, where did you go wrong?

How did you do? If you had a few problems, you will have an opportunity to take this quiz again later. In the meantime, rewrite or think through carefully the ones you had wrong.

TURN TO THE LEARNING ACTIVITIES

ON

THE NEXT PAGE

LEARNING ACTIVITIES:

Objective 2

SUM-OF-YEARS DIGITS - This method provides for a progressively declining depreciation. It is quite high at first which helps to offset the expense of acquiring the asset during that year. This provides for a tax advantage. It is calculated in the following manner:

a. A fraction is computed for a given year
b. The numerator is the number of years of remaining asset life at the beginning of the accounting period.
c. The denominator is the sum total of years for all accounting periods.

Keep in mind in this method--the main figuring is based on the fraction made up of the number of years remaining over the sum total of the years.

EXAMPLE -

An automatic sealer has been purchased for $100. It has an estimated 4-year life and an estimated salvage of $10. To figure out the annual depreciation, using the sum-of-years digits method:

Cost -$100

Estimated salvage- 10

Estimated life -4 yrs

1. Add the total number of digits of life together: 1 + 2 + 3 + 4 = 10
2. The rate applied is the number of years of life in reverse order over 10 or 4/10 for the first year, etc.
3. Multiply the fraction times the amount to be depreciated or $90.

Below is the schedule for 4 years:

Year	Rate	Amt. to be deprec.		Depreciation Expense
1	4/10	$90.00		$36.00
2	3/10	$90.00		27.00
3	2/10	$90.00		18.00
4	1/10	$90.00		9.00
			TOTAL	$90.00

What is the book value after the third year?
The book value is $19.00 or the sum of the three years depreciation of $36 plus $27 plus $18 deducted from $100.
TURN TO THE NEXT PAGE AND DO A PROBLEM FOLLOWING THIS EXAMPLE -----

Objective 2

PRACTICE EXERCISE:

USING THE SUM-OF-YEARS DIGITS, on a separate sheet, figure depreciation -

If a saw is purchased for $5,000 and is expected to last 5 years--with a probable salvage of $1,000. Follow the procedure shown on the previous page and prepare a schedule.

What is the book value of the asset at the end of the third year?

Is it $1,800? That's correct. If you got that, no doubt the rest of your problem is correct.

Turn to the next page to learn about Double Declining Balance. . .

LEARNING ACTIVITIES:

THE DOUBLE-DECLINING BALANCE

This method also provides for a higher depreciation charge in the earlier years of the asset's life. Thus, it provides a tax advantage and a financial advantage when capital has been used to purchase equipment, etc.

The most important thing to remember is that each year's depreciation is based on the balance after the previous year (years) has been figured and deducted from the cost. Also, it is based on double the straight-line and turned into a percentage. Keep in mind the three words underlined.

To find the maximum depreciation using this method:

1. Divide the number of years of useful life into 100%
2. Double the rate found in Step 1
3. Multiply the book value of the item by the rate obtained on Step 2.

NOTE: IN THIS METHOD, THE SALVAGE VALUE IS NOT DEDUCTED FROM THE COST.

If a sealer cost $100 and it were to last for 5 years--
100% divided by 5 equals 20% times 2 or 40%

YEAR	RATE	BOOK VALUE	DEPR. EXPENSE
1	40%	$100	$40.00
2	40%	60*	24.00
3	40%	36	14.40
4	40%	21.60	8.64
5	40%	12.96	5.18
		TOTAL	$92.22

*Book value is $100 less depr. expense of $40 or $60.

What is the book value at the end of the third year?

yes, $21.60.

TRY THE PROBLEM ON THE NEXT PAGE ---

Objective 2

PRACTICE EXERCISE:

DOUBLE DECLINING BALANCE METHOD - no salvage value is used

If a saw is purchased for $5,000 and is expected to last 5 years, figure the depreciation using the steps on the previous page. Use a separate sheet of paper.

What is the book value at the end of the third year? This is arrived at automatically in this method, isn't it? $1,080.

HOW ABOUT A LITTLE REVIEW?

Take a moment to think about the two methods you have just finished working with.

On a separate sheet of paper see if you can think of three words you would use to identify the double-declining balance method. Look back on the previous page and you will find them underlined.

What words would you use to identify the sum-of-years digits method? Look back to the beginning of the sum-of-years digits explanation and you will find them.

What are the advantages of the two methods you have just worked on? Find those answers in the explanations.

If you had 3 or more errors in the first term quiz, try it again now--on a separate sheet of paper.

MORE INFORMATION NEXT PAGE

UNITS OF PRODUCTION METHOD

This method is an entirely different principle--perhaps more accurate because it is based on actual production of items. This would, therefore, be used mainly for machinery which helps to make a product.

In this method, you must have an additional figure--that is, how many units expect to be produced during a given time period.

If an automatic sealer cost $100, has a salvage value of $10, and a 4-year estimated life, and an estimated 9,000 unit hours of production, here is how the depreciation would be figured. What will book value be at the end of the third year?

1. Take cost less salvage and divide by the number of units of production:

$$\frac{\$100 - \$10}{9{,}000} = .01 \text{ of depreciation}$$

2. Multiply the .01 times the total number of hours used per year. If the production hours are divided as follows:

Year	Units of Production	Depreciation
1	2000 x .01	$20.00
2	1700 x .01	17.00
3	2100 x .01	21.00
4	1900 x .01	19.00
	TOTAL	$87.00

3. Book value at the end of the third year would be $100 less $20, $17, and $21 or $42.00

A saw is purchased for $5,000. It is expected to last 5 years with an estimated salvage value of $1,000 and an estimated number of units of production of 20,000. Using the steps above, figure out the depreciation schedule for this asset. Do your work on a separate sheet of paper.

KEEP GOING ON TO THE NEXT PAGE FOR MORE

LEARNING ACTIVITIES:

The units per year are estimated as follows:

Year	
1	4500
2	3500
3	4200
4	4000

What is the book value at the end of 3 years?

Did you get $1,560? If you did, that is correct!!

If not, go back and review page 12.

NOW, GO ON TO THE NEXT PAGE, AND LEARN SOME MORE - - - - - - - -

LEARNING ACTIVITIES:

Objective 1

Here's the SECRET of it all!

KEY WORDS--

What are the key words for sum-of-years digits method?

What are the key words for double-declining balance method?

What are the key words for units of production?

Look back for those you do not remember.

Now work out some problems for the various methods -----

ON TO PAGE 15

Objective 2

PRACTICE EXERCISE: NO. 1

On a separate sheet of paper, complete the following problems. See how much of it you can do without referring to the examples, but refer to them, if necessary.

1. Assume that an asset costs \$500 with an estimated life of 4 years and a probable salvage of \$100.

   Figure the depreciation for each year using the sum-of-years digits method.

   Show the amount depreciated each year and the total amount depreciated in the 4 years.

2. Assume that an asset costs \$500 and it has a 5-year life, with no salvage in the calculation. Using the double-declining method of depreciation, show the amount depreciated each year and the total amount depreciated in the 5 years.

3. Apply units of production method to this same asset assuming \$500 less salvage of \$100 with 800 hours of production. What is the cost per hour of depreciation?

   Assume that the following was the division per year in amounts of units used per year:

   Year

   1 - 200 units
   2 - 175
   3 - 185
   4 - 160

   What would be the amount to be depreciated each of those 4 years?

   If you still did not have the term quiz completely correct the last time you did it, try it once more, then go on to PRACTICE EXERCISE 2

After completing the Practice Exercise, check your work with the Answer Key on page 17 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

Objective 2

PRACTICE EXERCISE: NO. 2

Use another sheet of paper to compute these problems. This time try to work them without referring to your examples, etc.

1. Sum-of-years digits = Round off to dollars, use the following column headings:

YEAR	DEPRECIATION RATE	DEPRECIATION EXPENSE

2. Double-declining balance using the following headings:

YEAR	COST	RATE	AMOUNT TO BE DEPR.	DEPRECIATION EXPENSE

3. Units of production based on: estimated units of production in total 300,000. No salvage value.

Year	No. of units Produced	DEPRECIATION EXPENSE
1	75,000	
2	70,000	
3	50,000	
4	55,000	
5	50,000	

A "toast" to your success in this final project!

After completing the Practice Exercise, check your work with the Answer Key on page 18 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

Objective 2

PRACTICE EXERCISE: NO. 2

Use another sheet of paper to compute these problems. This time try to work them without referring to your examples, etc.

1. Sum-of-years digits = Round off to dollars, use the following column headings:

   YEAR DEPRECIATION RATE DEPRECIATION EXPENSE

2. Double-declining balance using the following headings:

   YEAR COST RATE AMOUNT TO BE DEPR. DEPRECIATION EXPENSE

3. Units of production based on: estimated units of production in total 300,000. No salvage value.

Year	No. of units Produced	DEPRECIATION EXPENSE
1	75,000	
2	70,000	
3	50,000	
4	55,000	
5	50,000	

A "toast" to your success in this final project!

After completing the Practice Exercise, check your work with the Answer Key on page 18 of this mod. At this time, you may either want to review on your own or check with your instructor on some items, or request the Post-Practice (final) Exercise from your instructor.

KEY TO PRACTICE EXERCISE 1

1.

Year	1	4/10 x $400	$160
	2	3/10 x $400	120
	3	2/10 x $400	80
	4	1/10 x $400	40
		TOTAL	$400

2.

Year	1	40% of $500 =	$200.00	($500 - $200 = $300)
	2	40% of $300 =	120.00	($300 - $120 = $180)
	3	40% of $180 =	72.00	($180 - $ 72 = $108)
	4	40% of $108 =	43.20	($108 - $43.20 = $64.80)
	5	40% of $64.80=	25.92	
		TOTAL	$461.12	

3. $\frac{\$500 - \$100}{800}$ .50 per unit

Year 1 - 200	$100.00
2 - 175	87.50
3 - 185	92.50
4 - 160	80.00
TOTAL	$360.00

KEY TO PRACTICE EXERCISE 2

1.

YEAR	DEPRECIATION RATE	DEPRECIATION EXPENSE
1	5/15	$16,667
2	4/15	13,333
3	3/15	10,000
4	2/15	6,667
5	1/15	3,333

2. Double-declining balance computation

YEAR	COST	RATE	AMOUNT TO BE DEPR.	DEPR. EXPENSE
1	50,000	40%	50,000	20,000
2	50,000	40%	30,000	12,000
3	50,000	40%	18,000	7,200
4	50,000	40%	10,800	4,320
5	50,000	40%	6,480	2,592

3. Units of production

YEAR	NO. OF UNITS PRODUCED	DEPRECIATION EXPENSE
1	75,000	$1275
2	70,000	1190
3	50,000	850
4	55,000	935
5	50,000	850

KEY TO POST-PRACTICE EXERCISE

There are 25 answers as shown on the right.

1. Double-declining balance

YEAR	COST	RATE	AMT. TO BE DEPR.	DEPRECIATION EXPENSE	
1	$16,000	40%	$16,000.00	$ 6400.00	(1)
2	16,000	40%	9,600.00	3840.00	(2)
3	16,000	40%	5,760.00	2304.00	(3)
4	16,000	40%	3,456.00	1382.00	(4)
5	16,000	40%	2,073.60	829.44	(5)
			TOTAL	$14,755.44	(6)

2. Sum-of-years digits

YEAR	DEPRECIATION RATE	DEPRECIATION EXPENSE	
1	5/15	$ 5,000	(7)
2	4/15	4,000	(8)
3	3/15	3,000	(9)
4	2/15	2,000	(10)
5	1/15	1,000	(11)
		$15,000	(12)

3. Units of production method

YEAR	NO. OF UNITS OF PRODUCTION	DEPRECIATION EXPENSE	
1	150,000	$ 3,000.00	(13)
2	140,000	2,800.00	(14)
3	100,000	2,000.00	(15)
4	110,000	2,200.00	(16)
5	100,000	2,000.00	(17)
		$12,000.00	(18)

4. salvage (19)

5. depreciation (20)

6. book value (21)

7. double-declining balance (22)

8. 55 (23)

9. 6/21 (24)

10. tax (25)

Objective 2

POST-PRACTICE EXERCISE:

USE THE FOLLOWING INFORMATION FOR PROBLEMS 1 THROUGH 3

Machine Cost	$16,000
Est. Salvage	1,000
Est. life	5 years
Est. no. of units of production:	600,000

Used in Year	1	150,000
	2	140,000
	3	100,000
	4	110,000
	5	100,000

1. Figure out the schedule of depreciation using the double-declining balance method with the following headings:

YEAR	COST	RATE	AMT. TO BE DEPR.	DEPR. EXP.

Include the total

2. Figure out the schedule of depreciation using the sum-of-years digits with the following headings:

YEAR	DEPR. RATE	DEPR. EXP.

Include the total

3. Units of production method

YEAR	NO. OF UNITS PROD.	DEPRECIATION EXPENSE

Include the total for 5 years

FILL IN THE BLANKS:

4. The value remaining on an item after its useful life is finished is called the __________ or trade-in value.

5. __________ is defined as the loss of usefulness of fixed assets with the passage of time, wear and tear, inadequacy, and obsolescence.

CONTINUED ON THE NEXT PAGE

Objective 2

POST-PRACTICE EXERCISE:

6. __________ of an asset is the cost minus the depreciation deducted up to that point.

7. When the depreciation is always figured on the balance or book value, the __________ method is being used.

8. What is the sum-of-years digits for a machine whose life is 10 years? __________

9. For an item to be depreciated in six years, the fraction for the sum-of-years digits method would be __________ for the first year.

10. The __________ saving is one of the main advantages of the sum-of-years digits and double declining balance methods.

If the results of the Post-Practice Exercise show that you met the requirements of the Objective, you are to proceed to the next objective or module.

Reprinted and distributed with permission from
the Wisconsin Department of Public Instruction
Madison, Wisconsin by:

WISCONSIN VOCATIONAL STUDIES CENTER

964 Educational Sciences Building
1025 West Johnson Street
University of Wisconsin-Madison
Madison, Wisconsin 53706

For further information call our Publications
Unit at (608) 263-4357.